

## Repair Manual

Touran 2003 ➤ , Phaeton 2003 ➤ ,  
Eos 2006 ➤ , Tiguan 2008 ➤ ,  
Passat CC 2009 ➤ , Scirocco 2009 ➤ ,  
Golf 2009 ➤ , Golf Plus 2009 ➤ ,  
Polo 2010 ➤ , Golf Variant 2010 ➤ ,  
Jetta 2011 ➤ , CC 2010 ➤ ,  
Touareg 2010 ➤ , Sharan 2011 ➤ ,  
Polo KH IN 2010 ➤ , Polo Lim IN 2011 ➤ ,  
Passat 2011 ➤ , Passat Variant 2011 ➤ ,  
Golf Cabriolet 2012 ➤ , Beetle 2012 ➤ ,  
Passat (NMS - US) 2012 ➤ , up! 2012 ➤ ,  
The Beetle Cabriolet 2012 ➤ , CC 2012 ➤ ,  
Golf 2013 ➤ , e-up! 2014 ➤ ,  
e-Golf 2014 ➤ , Golf Variant 2014 ➤ ,  
Polo KH MY 2014 ➤ ,  
Polo Lim MY 2014 ➤ , Polo 2014 ➤ ,  
Scirocco 2015 ➤ , Golf Sportsvan 2015 ➤ ,  
Jetta 2015 ➤ , Polo KH IN 2015 ➤ ,  
Passat 2015 ➤ , Passat Variant 2015 ➤ ,  
Touareg 2015 ➤ , Polo KH MY 2015 ➤ ,  
Touran 2016 ➤ ,  
Passat (NMS - US) 2016 ➤ ,  
Polo Lim IN 2016 ➤ ,  
Polo Lim MY 2016 ➤ , Sharan 2016 ➤ ,  
Tiguan 2016 ➤ ,  
The Beetle Cabriolet 2017 ➤ ,  
The Beetle 2017 ➤ , Ameo 2017 ➤ ,  
e-up! 2017 ➤ , up! 2017 ➤ , Golf 2017 ➤ ,  
Golf Variant 2017 ➤ , Atlas 2017 ➤ ,  
e-Golf 2017 ➤ , Polo 2018 ➤ ,

Tiguan RUS 2017 ➤ ,  
Tiguan MEX 2017 ➤ , Arteon 2018 ➤ ,  
T-Roc 2018 ➤ , Golf MEX 2018 ➤ ,  
Golf Variant MEX 2018 ➤ , Jetta 2018 ➤ ,  
Touareg 2018 ➤ , Golf Sportsvan 2018 ➤ ,  
T-Cross 2019 ➤ ,  
Passat (NMS - US) 2019 ➤ ,  
Passat 2019 ➤ , Passat Variant 2019 ➤ ,  
Golf 2020 ➤ , e-up! 2020 ➤ , ID.3 2020 ➤ ,  
up! 2020 ➤ , Atlas 2020 ➤ ,  
T-Roc Cabriolet 2020 ➤ ,  
Atlas (PA) 2020 ➤ ,  
Polo Lim RUS 2020 ➤ , Arteon 2021 ➤ ,  
Arteon Shooting Brake 2021 ➤ ,  
ID.4 2021 ➤ , Golf Variant 2021 ➤ ,  
Tiguan 2021 ➤ , Taos Mex 2021 ➤ ,  
Taos Arg 2021 ➤ , Tiguan RUS 2021 ➤ ,  
ID.5 2021 ➤ , Polo 2022 ➤ ,  
Tiguan MEX 2022 ➤ , Taigo 2022 ➤ ,  
Taigun 2022 ➤ , T-Roc 2022 ➤ ,  
T-Roc Cabriolet 2022 ➤ , Virtus 2022 ➤ ,  
Touareg 2024 ➤ , Atlas (PA) 2024 ➤ ,  
Cross Sport PA 2024 ➤ , ID.3 2024 ➤ ,  
T-Cross 2024 ➤

## Wheel and Tire Guide General Information

Edition 06.2024



## List of Workshop Manual Repair Groups

### Repair Group

44 - Wheels, Tires, Wheel Alignment



Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.







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## 44 – Wheels, Tires, Wheel Alignment

### 1 Guide Usage Instructions

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⇒ [“1.1 Guide”, page 1](#)

⇒ [“1.2 General Information”, page 1](#)

⇒ [“1.3 Information”, page 2](#)

⇒ [“1.4 Determining Correct Wheel/Tire Combination according to NEFZ with Tire Package”, page 3](#)

⇒ [“1.5 Wheel/Tire Combination, Determining Correct Combination, According to WLTP”, page 5](#)

⇒ [“1.6 NEFZ, WLTP and RDE”, page 7](#)

⇒ [“1.7 Tire Package Definition”, page 7](#)

⇒ [“1.8 Explanations about Regions”, page 8](#)

#### 1.1 Guide

⇒ [“1.1.1 Wheel and Tire Guide General Information”, page 1](#)

⇒ [“1.1.2 Wheel and Tire Guide, Vehicle-Specific Section”, page 1](#)

##### 1.1.1 Wheel and Tire Guide General Information

The Wheel and Tire Guide General Information contains information about:

- ◆ Conversion requirements
- ◆ Assembly instructions/information on wheels, tires, temporary spare tires and snow chains
- ◆ Fault Finding; possible sources of malfunction

##### 1.1.2 Wheel and Tire Guide, Vehicle-Specific Section

The Wheel and Tire Guide vehicle-specific section contains information about:

- ◆ Converting options approved by the manufacturer
- ◆ Wheel allocations with original VW wheels
- ◆ Tire manufacturer recommendations

### 1.2 General Information

Volkswagen vehicles are engineered based on the latest developments in safety technology. To keep it that way, it is recommended to use only original Volkswagen replacement parts. These can be recognized by the VW-Audi trademark and by the part number. These replacement parts are known to be reliable, safe and suitable.

Despite ongoing market survey, we cannot assess other products on these points, even where in individual cases they have been passed by official inspectors or have been granted official



approval. Therefore, we cannot assume any liability if these products are installed.



#### Note

- ◆ *Products from original Volkswagen replacement parts and Volkswagen accessories may differ in regards to assembly requirements, tightening specifications, etc.*
- ◆ *Pay attention to the tightening specifications for the wheel bolts.*
- ◆ *Pay attention to the assembly and installation instructions.*

The wheel and tire combinations and retrofittings listed in the vehicle tables refer exclusively to Volkswagen original disc wheels. Approval of wheel/tire combinations or retrofittings with disc wheels from the accessories trade is not possible with the accompanying parts certificate.

#### Information about Recommended Tires

- ◆ Tires are one of the most important construction elements of a vehicle and significantly influence driving safety. Therefore, the numerous requirements detailed in the DIN standards and the W.d.K. (Trade association of the German rubber industry) and tire manufacturer guidelines must be fulfilled. In addition, extensive tests are performed by Volkswagen before the tires are approved for original equipment on our vehicles.
- ◆ All tire makes/treads, with which VW vehicles are equipped at the factory at the time this guide edition was published, are listed in the allocations for the recommended tires.
- ◆ These tire makes/treads fulfill the specified requirements. We therefore recommend using the tire makes/treads recommended in this guide when equipping vehicles with new tires.
- ◆ Pay attention to the important notes regarding run-flat tires. Refer to ⇒ ["7.6 Overview - Radial Ply Tire", page 83](#).
- ◆ The winter tire sizes listed in the tables are the most sensible in terms of dynamic and economical driving. In principle, all other wheel/tire combinations listed in the Certificate of Conformity or in the certificate of registration Part I can be installed as M & S tires.

### 1.3 Information

- Type and size of snow chains. Refer to ⇒ Owner's Manual, Snow Chains .
- There is always only one tire package allocated to the vehicle in the certificate of registration section 1.
- General information about winter tires (refer to ⇒ ["7.10 Winter Tires", page 91](#) ) and
- General information about snow chains (refer to ⇒ ["14 Snow Chains", page 138](#) ).
- All tire sizes listed in the vehicle papers can also be driven as winter tires! It is recommended to use winter tires with the tire size by which snow chains can be used. Refer to ⇒ Owner's Manual; Snow Chains .
- The type approval data is shown in the wheel and tire combination tables. Tires that are not labeled with M+S, however, can be used as winter tires. Only when using winter tires is it permitted that the highest speed attainable by the vehicle



lies above the highest speed of winter tires specified by the speed symbol. If this is the case, an information label must be placed in the driver's line of sight. Refer to ➤ [“7.10 Winter Tires”, page 91](#) .

## 1.4 Determining Correct Wheel/Tire Combination according to NEFZ with Tire Package

➤ [“1.4.1 Determining the Correct Tire Package Using the PR Number”, page 3](#)

➤ [“1.4.2 Determining the Correct Tire Package using the Version Key in Certificate of Registration Section 1”, page 3](#)

### 1.4.1 Determining the Correct Tire Package Using the PR Number

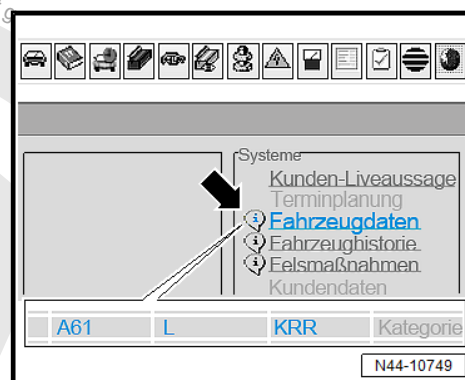
There are two options for determining the tire package assigned to a vehicle:

- 1 - Using the corresponding PR number from the PR number family KRR. Refer to ➤ [page 3](#) .
- 2 - Using the version key in the certificate of registration section 1. Refer to ➤ [“1.4.2 Determining the Correct Tire Package using the Version Key in Certificate of Registration Section 1”, page 3](#)

The PR number can be accessed in the ELSA vehicle data -arrow-.

The tire package is located under the “KRR” family. The corresponding PR number for the tire package can be read there.

In this example, the vehicle has tire package A61 installed.



### 1.4.2 Determining the Correct Tire Package using the Version Key in Certificate of Registration Section 1

There are two options for determining the tire package assigned to a vehicle:

- 1 - Using the corresponding PR number from the PR number family KRR. Refer to ➤ [“1.4.1 Determining the Correct Tire Package Using the PR Number”, page 3](#) .
- 2 - Using the version key in the certificate of registration section 1. Refer to ➤ [page 3](#)

**Procedure. Refer to .**

- ◆ Finding the type approval number in the certificate of registration section 1 under K
- ◆ Breakdown of the version key in the certificate of registration section 1 under D2
- ◆ Selecting the displacement and the output





- ◆ Select the tire package via the version key D2, for example package 61. Refer to ➔ Wheel and Tire Guide; Rep. Gr. 44 ; Version Key (D2)
- ◆ Selecting a possible wheel/tire combination. Refer to ➔ Wheel and Tire Guide; Rep. Gr. 44 ; Wheel/Tire Combinations, Based on Tire Packages .

**D.2 - Contains the Variant Key and the Version Key**

**K - Contains the type approval number**

**P.1 - Displacement in cm<sup>3</sup>**

**P.2 - Power Rating in kW**

The diagram shows a sample of a 'Zulassungsbesccheinigung Teil I' (Type Approval Certificate Part I) form. Four callouts point to specific fields:

- D.2** points to the 'D' field in the 'Zulassungsbesccheinigung Teil I' section.
- P.2** points to the 'P' field in the 'Zulassungsbesccheinigung Teil I' section.
- P.1** points to the 'P' field in the 'Zulassungsbesccheinigung Teil I' section.
- K** points to the 'K' field in the 'Zulassungsbesccheinigung Teil I' section.

The form itself contains various fields for technical specifications, including 'Zulassungsbesccheinigung Teil I', 'Zulassungsbesccheinigung Teil II', 'Zulassungsbesccheinigung Teil III', and 'Zulassungsbesccheinigung Teil IV'. It also includes a table for 'Zulassungsbesccheinigung Teil I' with columns for 'Zulassungsbesccheinigung Teil I', 'Zulassungsbesccheinigung Teil II', 'Zulassungsbesccheinigung Teil III', and 'Zulassungsbesccheinigung Teil IV'.

#### Example:

D.2 - FM6 FM6AJ018 7MM 61

K - e13\*2007/46\*1845\*01

P.1 - 1.984 cm<sup>3</sup>

P.2 - 140 kW





## 1.5 Wheel/Tire Combination, Determining Correct Combination, According to WLTP

⇒ [“1.5.1 Certificate of Registration Section 1”, page 5](#)

⇒ [“1.5.2 COC Paper Number 0.10.”, page 6](#)

### 1.5.1 Certificate of Registration Section 1

#### Procedure

- 1 - Write down the type approval number under “K” from the certificate of registration section 1 or 2.
- 2 - Write down the displacement under “P1” and the power rating under “P2” from the certificate of registration section 1.
- 3 - With the Type Approval Number select the assigned chapter “Possible Wheel/Tire Combinations” from the Wheel and Tire Guide. Refer to ⇒ Wheel and Tire Guide; Rep. Gr. 44 ; Possible Wheel and Tire Combinations .
- 4 - Determine the relevant wheel and tire combination. At the same time depending on vehicle equipment the “Version Key (D2) Explanation” is necessary.
- 5 - If necessary, with the type approval number note the assigned chapter Version Key (D2) Explanation from the Wheel and Tire Guide. Refer to ⇒ Wheel and Tire Guide; Rep. Gr. 44 ; Version Key (D2) .
- 6 - Write down the relevant wheel/tire combinations for the vehicle.



**D.2 - Contains the Variant Key and the Version Key**

**K - Contains the type approval number**

**P.1 - Displacement in cm<sup>3</sup>**

**P.2 - Power Rating in KW**

The diagram shows a 'Zulassungsbesccheinigung Teil I' form. Callouts point to the following fields:

- D.2** points to the 'Fahrzeugkennzeichen' (Vehicle Registration Number) field.
- P.2** points to the 'Leistung' (Power) field.
- P.1** points to the 'Hubraum' (Displacement) field.
- K** points to the 'Typennummer' (Type Number) field.

A watermark on the left side of the form reads: 'Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorized by Volkswagen AG'.

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**Example:**

D.2 - FD7 FD7GC002 N 4BF M ML 1A VR2 A

K - e1\*2007/46\*2014\*01

P.1 - 1.984 cm<sup>3</sup>

P.2 - 140 kW

## 1.5.2 COC Paper Number 0.10.

The type approval number can be found in the COC paper "Certificate of Conformity" under the point 0.10.

Additional information can be found under Refer to ⇒ ["2.5 Certificate of Conformity", page 13](#) .

The additional process for determining the applicable wheel and tire combination is described under the procedure, refer to ⇒ ["1.5.1 Certificate of Registration Section 1", page 5](#) .



## 1.6 NEFZ, WLTP and RDE

⇒ ["1.6.1 What are NEFZ, WLTP and RDE", page 7](#)

⇒ ["1.6.2 What is the difference between WLTP and RDE", page 7](#)

⇒ ["1.6.3 From when do WLTP and RDE apply", page 7](#)

### 1.6.1 What are NEFZ, WLTP and RDE

NEFZ ("Neuer Europäischer Fahrzyklus") New European Driving Cycle describes a dynamometer measurement that has been used in Europe since 1992, to determine the exhaust emissions and fuel consumption of passenger vehicles and light commercial vehicles.

The NEFZ has been replaced by the world wide test method WLTP ("Worldwide Harmonised Light-Duty Vehicles Test Procedure"). The new procedures should show a more realistic picture of the consumption of a vehicle and is based on a different test cycle with stricter inspection requirements.

In addition to WLTP in Europe the emissions should also be determined according to the RDE test procedure ("Real Driving Emissions"), in which the measurement is taken in traffic conditions.

### 1.6.2 What is the difference between WLTP and RDE

For WLTP a vehicle is driven for 30 minutes on a roller test stand under standard parameters, the RDE test takes place in the open street. For the RDE measurement a one third mixed route is used (1/3 city, 1/3 country, 1/3 highway). The RDE measurement takes between 90 and maximum 120 minutes.

### 1.6.3 From when do WLTP and RDE apply

From September 2017 there is a successive switch to WLTP and RDE. From September 2018 the WLTP test procedure is required for all new vehicles as well as the limiting particle numbers (PN) in RDE. From September 2019 a RDE threshold for nitrogen oxide (NOx) is required for all new registrations.

## 1.7 Tire Package Definition

To increase energy efficiency, environmental protection, and driving safety special tire packages were developed for every vehicle model and assembled based on the engine.

To attain an efficient product for the final consumer, the tire packages were developed to reduce CO<sub>2</sub> emissions according to a European Union requirement and also to maintain country-specific tax provisions.

More information about CO<sub>2</sub> emissions and the roll resistance. Refer to ⇒ Wheel and Tire Guide; Rep. Gr. 44 ; EU Tire Label; EU Tire Label, Categories; EU Tire Label, Categories, Roll Resistance .

**There are two options for determining the tire package assigned to a vehicle:**

- 1 - Using the corresponding PR number from the PR number family KRR. Refer to ⇒ ["1.4.1 Determining the Correct Tire Package Using the PR Number", page 3](#) .
- 2 - Using the version key in the certificate of registration section 1. Refer to ⇒ ["1.4.2 Determining the Correct Tire](#)



Package using the Version Key in Certificate of Registration Section 1", page 3

## 1.8 Explanations about Regions

The following information lists the countries that are combined into a region.

Region	Countries in the region
AGCC (Arab Gulf Cooperation Council)	Bahrain Qatar Kuwait Oman Saudi Arabia United Arab Emirates
Europe	Belgium Germany France Spain Portugal Italy Austria Switzerland Netherlands Luxemburg Poland Czech Republic Romania Slovakia Hungary Slovenia Croatia Great Britain
North America	USA Canada
Scandinavia	Denmark Finland Sweden Norway
South America	Argentina Brazil Bolivia Chile Ecuador Columbia Paraguay Peru Uruguay Venezuela



## 2 Legal and Technical Requirements

⇒ [“2.1 Legal Requirements”, page 9](#)

⇒ [“2.2 Technical Requirements”, page 9](#)

⇒ [“2.3 Load Rating Depending on Speed and Winter Tires”, page 10](#)

⇒ [“2.4 Vehicle Registration Documents since 10/01/2005”, page 12](#)

⇒ [“2.5 Certificate of Conformity”, page 13](#)

### 2.1 Legal Requirements

⇒ [“2.1.2 Vehicles with Tire Pressure Monitoring System”, page 9](#)

#### 2.1.1 Permitted Wheel and Tire Combinations in Germany (Not for North America Market)

The manufacturer is granted general type approval for the whole vehicle as well as for specific retrofitting (general type approval according to § 20 StVZO and EU type approval).

Retrofittings on wheels and tires can be done under certain circumstances. The following must be noted while doing so:

- ◆ If the wheel and tires sizes along with the load index and speed symbol are contained in the general type approval or EU type approval, then this tire/wheel combination can be mounted on the vehicle. Refer to ⇒ [“2.5 Certificate of Conformity”, page 13](#).

It is not necessary to install the wheel/tire combination specified in the registration certification Part I (vehicle registration). All combinations approved in the general type approval or EU type approval can be mounted on the vehicle. Refer to ⇒ [“2.5 Certificate of Conformity”, page 13](#).

- ◆ There is no general type approval according to § 22 StVZO for the retrofittings recommended (see approval certificate).
- ◆ If the wheels and/or tires are not contained in the general type approval or EU type approval, then vehicle cannot be retrofitted according to the Vehicle Registration Regulation (VRR) specifications.

These statements refer to legal requirements in the European Union. No claims are made as to their completeness.

#### 2.1.2 Vehicles with Tire Pressure Monitoring System

The EU regulation (No. 661/2009) requires that all new vehicles must have a tire pressure monitoring system starting 11/01/2014. There are two different systems to be used. The difference is between the indirect measuring “tire pressure monitoring display” system and the direct measuring “tire pressure monitoring system”. Refer to ⇒ [“5 Tire Pressure Monitoring System”, page 41](#).

### 2.2 Technical Requirements

- The wheel and tire combinations or retrofittings listed in the individual vehicle tables refer exclusively to original disc wheels.



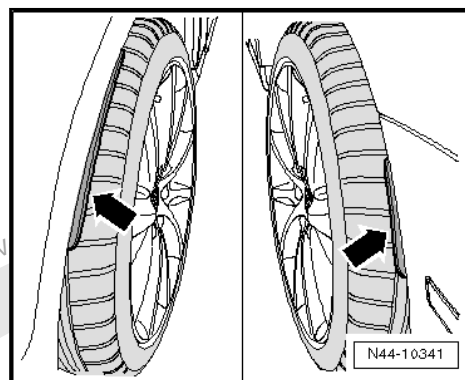
- Approval of wheel/tire combinations or retrofittings with disc wheels from the accessories trade is not possible with the accompanying parts certificate.
- Tubeless radial tires may only be used with tapered bead seat rim with a safety bead seat, for example a round hump.
- Run-flat tires (reinforced sidewall) may only be used on disc wheels with extended hump and vehicles with a tire pressure monitoring system. Refer to ➔ ["7.7.2 Run-Flat Tire, Retrofitting/Conditions for use of Run-Flat Tires", page 89](#) .
- The correct tire inflation pressure values must be observed when the specified wheel and tire combinations are used. The tire pressures are listed on the tire pressure label on the inside of the fuel filler door and on the driver side B-pillar.
- Sufficient clearance between the wheels and tires and the wheel housing-, suspension- and brake components is ensured if the instructions and conditions specified in the approval certificate are observed under all operating conditions.
- If not otherwise specified, snow chains may be mounted only on the drive wheels. If the vehicle has AWD, then snow chains may be used on the front wheels only.

#### Additional Wheel Housing Extensions, FLAPS

On some vehicles with certain wheel/tire combinations, wheel housing enlargements (FLAPS) must be attached on the fenders or bumper for certification/technical reasons -arrows-.

Please check whether FLAPS must be installed.

The necessary wheel/tire combination information can be found in the overview tables for the respective vehicles.



## 2.3 Load Rating Depending on Speed and Winter Tires

### Winter Tires, Maximum Speeds for V and Extra Load (XL)

Vehicle	Version	Driving mode	Maximum axle load	Winter Tires	v <sub>max</sub> with V winter tires
Phaeton from MY 2003 3.2L/177 kW V6 Short and long wheel base	Sedan	FWD	1420 kg	235/60 R 16 100 V	240 km/h (149.1 mph)
				235/55 R 17 99V	235 km/h (146 mph)
				235/50 R 18 101 V extra load	240 km/h (149.1 mph)
				245/45 R 19 102V extra load	230 km/h (142.9 mph)
				255/40 R 19 100 V extra load	240 km/h (149.1 mph)
Phaeton from MY 2003 3.0L/ 165 kW V6 TDI	Sedan	4MOTION	1490 kg	235/55 R 17 99V	220 km/h (136.7 mph)



Vehicle	Version	Driving mode	Maximum axle load	Winter Tires	v <sub>max</sub> with V winter tires
Short and long wheel base				235/50 R 18 101 V extra load	240 km/h (149.1 mph)
				245/45 R 19 102V extra load	230 km/h (142.9 mph)
				255/40 R 19 100 V extra load	230 km/h (142.9 mph)
Phaeton from MY 2003 4.2L/246 kW V8 Short wheel base	Sedan	4MOTION	1430 kg	235/55 R 17 99V	235 km/h (146 mph)
				235/50 R 18 101 V extra load	240 km/h (149.1 mph)
				245/45 R 19 102V extra load	230 km/h (142.9 mph)
				255/40 R 19 100 V extra load	240 km/h (149.1 mph)
Phaeton from MY 2003 4.2L/246 kW V8 Long wheel base	Sedan	4MOTION	1450 kg	235/55 R 17 99V	230 km/h (142.9 mph)
				235/50 R 18 101 V extra load	240 km/h (149.1 mph)
				245/45 R 19 102V extra load	230 km/h (142.9 mph)
				255/40 R 19 100 V extra load	240 km/h (149.1 mph)
Phaeton from MY 2003 5.0L/230 kW V10 TDI short wheel base	Sedan	4MOTION	1640 kg	235/50 R 18 101 V extra load	210 km/h (130.5 mph)
Phaeton from MY 2003 5.0L/230 kW V10 TDI long wheel base	Sedan	4MOTION	1650 kg	235/50 R 18 101 V extra load	210 km/h (130.5 mph)
Phaeton from MY 2003 6.0L/309 kW W12  Short and long wheel base	Sedan	4MOTION	1550 kg	235/50 R 18 101 V extra load	235 km/h (146 mph)
				245/45 R 19 102V extra load	230 km/h (142.9 mph)
				255/40 R 19 100 V extra load	220 km/h (136.7 mph)
Phaeton from MY 2003 6.0L/331 kW W12  Short and long wheel base	Sedan	4MOTION	1550 kg	235/50 R 18 101 V XL	230 km/h (142.9 mph)
				245/45 R 19 102V XL	230 km/h (142.9 mph)
				255/40 R 19 103 V XL	240 km/h (149.1 mph)





## Permission stipulations in Germany

Only when using winter tires is it permitted that the highest speed attainable by the vehicle lies above the highest speed of winter tires specified by the speed symbol.

In this case, an information label must be applied with the following content:

<b>Attention, winter tires!</b>
Maximum permissible speed ...km/h



### Note

*This information label must be in the driver's field of view!*

## 2.4 Vehicle Registration Documents since 10/01/2005

The implementation of EU guideline 1999/37/EG "Vehicle registration documents" in national legislation and legal data protection requirements have made the introduction of new, fraud resistant registration documents necessary.

Since 10/01/2005, the new documents are issued by the authorities in the case of new registrations, change of owner, entry of technical changes and all other changes.

The new registration documents consist of:

- ◆ The registration certificate part I, which replaces the vehicle registration and
- ◆ The registration certificate part II that supersedes the vehicle title.

### Registration certificate part I (vehicle registration)

- ◆ contains all technical vehicle data that must be present to register a vehicle in Europe but only a standard approved wheel/tire combination is specified
- ◆ has the EU-wide alphanumeric codes allocated to the technical data so that the German certificate of registration can be converted without problems in the foreign countries of the EU into the registration document required there
- ◆ contains a field to document the temporary or final decommissioning of the vehicle and is no longer drawn in the case of a temporary or final decommissioning.

### Registration certificate part II (vehicle title)

- ◆ contains information that the holder of the registration certificate is not declared the owner
- ◆ only contains the current and, if available, last vehicle owner, the actual number of previous owners is indicated numerically
- ◆ only contains a small portion of the technical vehicle data
- ◆ does not document temporary vehicle decommissioning In the future, the vehicle and body type listed under digit 1 in the old vehicle documentation will no longer exist. It is replaced in the new documents with EU-standardized vehicle classes with body type

The introduction of the new registration documents results in hardly any changes for the driver.





As with the old vehicle registration the registration certificate part I (vehicle registration) should be kept in the vehicle and presented to responsible persons upon request.

**It is not necessary to install the wheel/tire combination specified in the registration certification Part I (vehicle registration). All combinations approved according to the vehicle general type approval or EU type approval may be used. Refer to ➤ ["2.5 Certificate of Conformity", page 13](#) .**

The permissibility of a wheel/tire combination that deviates from the vehicle general type approval or EU type approval must be verified with an entry in the registration certificate part I (vehicle registration), an installation certificate due to a parts certificate or a general type approval for the wheel/tire combination.

## 2.5 Certificate of Conformity

The vehicle manufacturer must request an EU type approval for all passenger vehicles (vehicle class M1).

A certificate of conformity is produced based on this type approval.

This document confirms that the vehicle conforms to the EU operating license and is registered in every EU country without the need for individual approval.

The issuing applies to all vehicles that were produced in accordance with the EU operating license.

These vehicles have an EU type plate (black sticker) in the driver door area or in the engine compartment on older vehicles.

The certificate of conformity has the same importance as the operating license, so the original should not be kept in the vehicle.

In the certificate of conformity additional technical data and all permitted wheel/tire combinations are listed.

## 2.6 EU Type Approval Number, Sales Code and Sales or Brand Name (Not for North America Market)

Since 01/01/1998, all passenger vehicles licensed for road use within the European Union must possess type approval according to EU guidelines . Vehicles licensed for road use with single-vehicle approval according to § 21 StVZO in Germany are excepted.

Therefore, the same guidelines apply to all automobile manufacturers. Consequently, international trade within the EU has been simplified.

The certificate of conformity contains the EU type approval number and detailed technical information about the vehicle such as the emissions category and all permitted wheel/tire combinations. Refer to ➤ [page 13](#) .

EU type approval number (type approval)	Sales type	Sales/Trade designation
AA	121	Up! From MY 2012
AA	122	Up! From MY 2017
AA	123	Up! From MY 2020
AA	BL1	e-up! From MY 2014
AA	BL2	e-up! From MY 2017
AA	BL3	e-up! From MY 2020
6R	6R	Polo from MY 2010
6R	6C	Polo from MY 2014



EU type approval number (type approval)	Sales type	Sales/Trade designation
AW	AW1	Polo from MY 2018
AW	AE1	Polo from MY 2022
CK	CK4	Polo Russia from MY 2020
CS	CS1	Taigo from MY 2022
1K	5K	Golf from MY 2009
AU	5G	Golf from MY 2013
AU	BQ1	Golf from MY 2017
CD	CD1	Golf from MY 2020
AU	BE1	e-Golf from MY 2014
1KM	AJ5	Golf Wagon from MY 2010
AUV	BA5	Golf Wagon from MY 2014
AUV	BV5	Golf Wagon from MY 2017
CDV	CG5	Golf Wagon from MY 2021
A1	A11	T-Roc from MY 2018
A1	D11	T-Roc from MY 2022
A1	AC7	T-Roc Cabriolet from MY 2020
A1	AC8	T-Roc Cabriolet from MY 2022
C1	C11	T-Cross from MY 2019
C1	D31	T-Cross from MY 2024
1K	517	Golf Cabriolet from MY 2012
16	162	Jetta from MY 2011
16	5C1	Beetle from MY 2012
1KP	521	Golf Plus from MY 2009
AUV	AM1	Golf Sportsvan from MY 2015
AUV	AN1	Golf Sportsvan from MY 2018
1T	1T	Touran from 2003; Cross Touran from 2008
1T	5T	Touran from MY 2016
13	137	Scirocco from MY 2009
13	138	Scirocco from MY 2015
1F	1F	Eos from MY 2006
3C	362	Passat Sedan from MY 2011
3C	365	Passat Wagon from MY 2011
3C	3G2	Passat from MY 2015
3C	3G5	Passat Wagon from MY 2015
3C	CB2	Passat from MY 2019
3C	CB5	Passat Wagon from MY 2019
3CC	357	Passat CC from MY 2009 and CC from MY 2010
3CC	358	CC from MY 2012
3H	3H7	Arteon from MY 2018
3H	3H8	Arteon from MY 2021
3H	3H9	Arteon Shooting Brake from MY 2021
3D	3D	Phaeton from MY 2003
5N	5N	Tiguan from MY 2008
5N	AD1	Tiguan from MY 2016
5N	BW2	Tiguan Allspace from MY 2017
5N	AX1	Tiguan from MY 2021



EU type approval number (type approval)	Sales type	Sales/Trade designation
5N	BJ2	Tiguan Allspace from MY 2022
7N	7N	Sharan from MY 2011, Sharan from MY 2016
7P	7P	Touareg from MY 2010, Touareg from MY 2015
CR	CR7	Touareg from MY 2018
CR	RC8	Touareg from MY 2024
E1	E11	ID.3 from MY 2020
E1	E12	ID.3 from MY 2024
E2	E21	ID.4 from MY 2021
E2	E39	ID.5 from MY 2022
	CA2	Atlas (PA) from MY 2020
	CA3	Atlas (PA) from MY 2024





## 3 Wheel, Changing

⇒ [“3.1 Assembly Instructions”, page 16](#)

⇒ [“3.2 Wheel Centering Seat, Protecting against Corrosion”, page 19](#)

⇒ [“3.3 Wheel, Mounting”, page 19](#)

⇒ [“3.4 Anti-Theft Wheel Bolt Positioning on Steel Wheels”, page 20](#)

### 3.1 Assembly Instructions

#### Special tools and workshop equipment required

◆ Torque Wrench

◆ Wax Spray - D 322 000 A2-

**Note the legal requirements for vehicles with tire pressure monitoring system starting from 11/01/2014. Refer to ⇒ [“2.1.2 Vehicles with Tire Pressure Monitoring System”, page 9](#).**

#### Vehicles with tire pressure monitoring sensor.

If wheels are changed (for example, change from summer to winter tires), wheel electronics send data as soon as speed of new wheels exceeds 25 km/h (15.5 mph). The control module automatically recognizes the identification numbers of the new wheel electronics.

An acceleration data check also occurs with vehicle speed. This process takes about 7 minutes.

Tire Pressure Monitoring Control Module - J502- must first switch to learning mode before it can automatically learn wheel electronics.

Vehicle must stand for 20 minutes for this. This takes five minutes after a recognized tire puncture.

If the standing time is not followed, control module is not in learning mode so system recognizes a malfunction and can only automatically learn wheel electronics after standing 20 minutes.



#### Note

- ◆ *When changing wheels, ensure only vehicle manufacturer approved wheel/tires combinations with tire pressure given on fuel filler flap are installed.*
- ◆ *If unapproved wheel/tire combinations are installed, they must have a certificate from a technical testing organization for the particular vehicle and a second wheel set must be programmed using the ⇒ Vehicle diagnostic tester.*
- ◆ *An adaptation is also needed if tire pressure deviates from pressures given on fuel filler flap.*

#### Wheel sets with other specified tire pressures

If a vehicle is equipped with tires which have specified pressures different from those listed on fuel filler flap, these tires (second wheel set) can also be monitored by the Tire Pressure Monitoring System (TPMS).

Specified tire pressures for a second wheel set must be entered into the system using the ⇒ Vehicle diagnostic tester.



Wheel electronics on wheels from second set are not automatically recognized and learned by the tire pressure monitoring system (as wheel electronics on vehicle manufacturer approved wheel/tire combination set are).

To change to a second wheel set, the following steps must be carried out:

- ◆ Read the wheel electronic (tire pressure sensors) identification numbers (IDs) before installing.
- ◆ Switch the TPMS to wheel set 2.
- ◆ Enter needed specified tire pressures and wheel electronic IDs in system.

#### Continuation for all vehicles



#### Note

*The wrench size of the included wheel bolt adapter can be vary from the wrench size of the respective master set.*

- Switch off the ignition.



#### NOTICE

**Corrosion, dirt, oil and grease can cause the wheel bolts and wheels to become loose.**

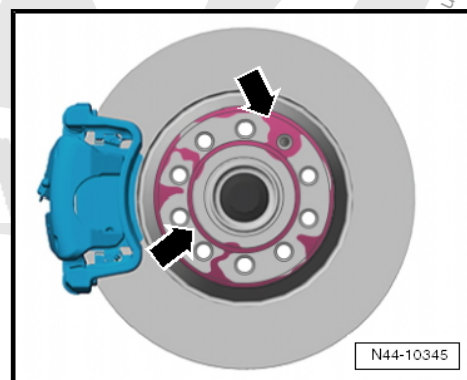
- Clean the affected parts and areas.



#### Note

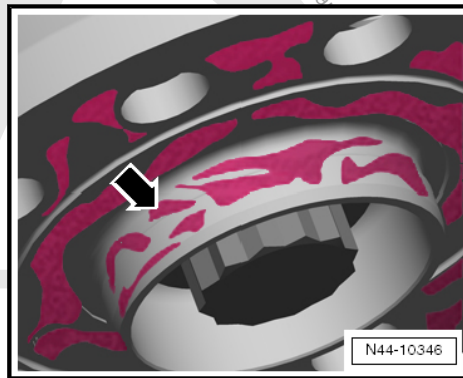
*After removing or installing one or multiple tires, the tire pressure monitoring system must be recalibrated for vehicles with tire pressure monitoring system using the ➔ Vehicle diagnostic tester.*


- Make sure the contact surfaces -arrows- on the brake rotor are free of corrosion and dirt.



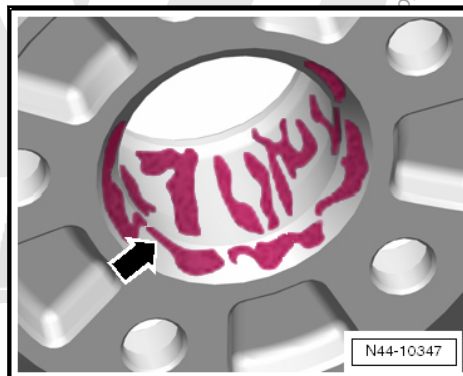


- Make sure the contact surfaces -arrow- on the wheel hub center seat are free of corrosion and dirt.

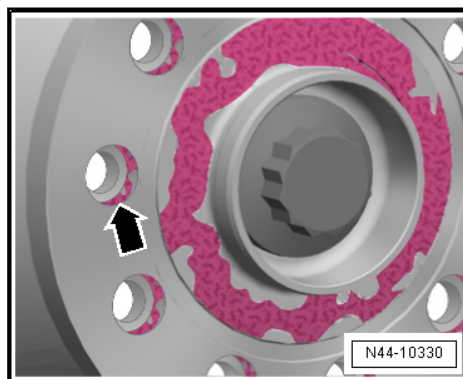


- Make sure the contact surface -arrow- on the wheel inner side (rim) as well as the central seat in the rim is free of corrosion and dirt.
- The spherical caps (refer to ) in the wheel bolt openings and the wheel bolt threads must likewise be free of corrosion, dirt, oil or grease.

1) The spherical cap is the curved surface of a section of a sphere.



- Check whether the wheel bolts can be easily screwed in by hand. The threads of the wheel bolts must not touch the holes in the brake rotor -arrow-.
- If the wheel bolt thread touches the hole -arrow-, then the brake rotor must be turned.



#### Remove any dirt or corrosion:

- ◆ Oil or grease from the contact surfaces
- ◆ Oil or grease from the threads on the wheel hub
- ◆ Oil or grease from the threads on the wheel bolts

#### NOTICE

Heavily corroded, difficult to turn and/or damaged wheel bolts can become loose.

- Wheel bolts must be replaced.

#### Applies to light-alloy and steel wheels

When a wheel is changed, the wheel centering seat should be sprayed with Wax Spray to prevent corrosion between the wheel centering seat and the rim. Refer to ➤ Electronic Parts Catalog (ETKA) \ .

- Protect the wheel centering seat from corrosion. Refer to ➤ [“3.2 Wheel Centering Seat, Protecting against Corrosion”, page 19](#) .
- Install the wheel. Refer to ➤ [“3.3 Wheel, Mounting”, page 19](#) .





## 3.2 Wheel Centering Seat, Protecting against Corrosion

### Applies to light-alloy and steel wheels

When a wheel is changed, the wheel centering seat should be sprayed with Wax Spray to prevent corrosion between the wheel centering seat and the rim. Refer to ⇒ Electronic Parts Catalog (ETKA) \ .

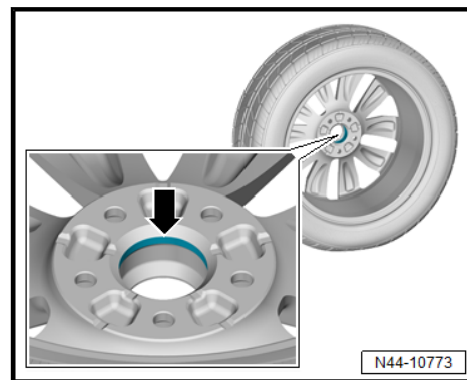
- Remove the wheel.
- Thoroughly clean the centering seat on the wheel hub and the centering surface on the rim.
- Apply wax in area of centering -arrow- using a brush.

**Always make sure that only centering -arrow- is waxed and not rim contact surfaces. As a consequence, the brakes would become contaminated while driving and thereby result in poor braking.**

#### NOTICE

**Brakes can become contaminated while driving and thereby result in poor braking.**

- Only wax the rim centering.
- Install the wheel and tighten. Refer to ⇒ Wheel and Tire Guide; Rep. Gr. 44 ; Wheels, Tires; Wheel Bolt Tightening Specifications .



## 3.3 Wheel, Mounting

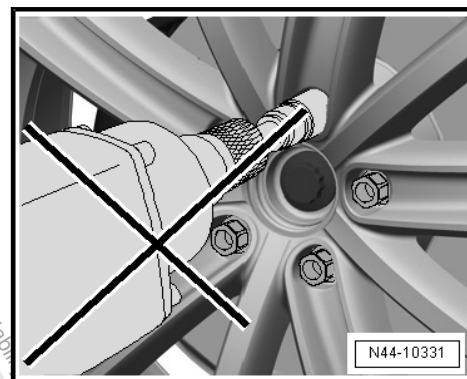
- Coat the wheel centering seat with protective material. Refer to ⇒ [“3.2 Wheel Centering Seat, Protecting against Corrosion”, page 19](#) .

- 1 - When mounting a wheel, tighten all-wheel bolts evenly by hand.
- 2 - Tighten the wheel bolts diagonally to approximately 30 Nm.
- 3 - Lower the vehicles onto the floor. Using the torque wrench, tighten all-wheel bolts to the tightening specification in a diagonal sequence. Refer to ⇒ Wheel and Tire Guide; Rep. Gr. 44 ; Wheels, Tires; Wheel Bolt Tightening Specifications .

#### NOTICE

**Wheel bolts installed with an impact wrench can become loose.**

- Install all-wheel bolts evenly by hand.
- Tighten the wheel bolts diagonally to approximately 30 Nm.
- Using the torque wrench, tighten the wheel bolts to the tightening specification in a diagonal sequence.





### 3.4 Anti-Theft Wheel Bolt Positioning on Steel Wheels

#### NOTICE

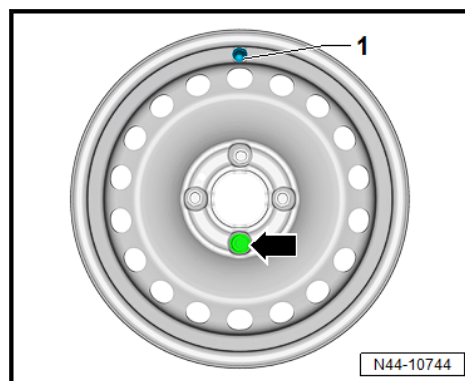
The full wheel cover can become loose while driving and fall off.

- Install the anti-theft wheel bolt at the correct position.
- Otherwise the secure fit and centering of the full wheel cover is not ensured.

#### Steel wheels with four holes

The anti-theft wheel bolt -arrow- must only be installed across from the valve -1-.

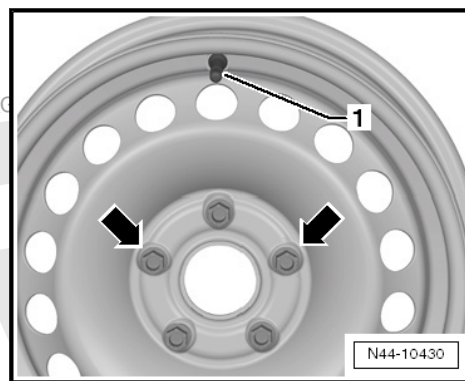
The decorative wheel hubcap can be installed on the steel wheel securely only when the anti-theft wheel bolt is installed in this position.



#### Steel wheels with five holes

The anti-theft wheel bolt must be installed either to the right or to the left -arrows- of the valve -1- on steel wheels.

The decorative wheel hubcap can be installed on the steel wheel securely only when the anti-theft wheel bolt is installed in this position.







## 4 Tires, Mounting

- ⇒ ["4.1 Tires, Dismounting", page 21](#)
- ⇒ ["4.2 Tire Sealant, Removing", page 21](#)
- ⇒ ["4.3 Tires, Dismounting", page 22](#)
- ⇒ ["4.4 Tires, Bringing to Mounting Temperature", page 25](#)
- ⇒ ["4.5 Tires, Mounting", page 26](#)
- ⇒ ["4.6 Tires and Rims, Matching", page 31](#)
- ⇒ ["4.7 Tire and Wheel Radial and Lateral Run-Out, Checking", page 32](#)
- ⇒ ["4.8 Wheels and Tires, Matching", page 33](#)
- ⇒ ["4.9 Wheel, Balancing", page 35](#)
- ⇒ ["4.10 Tire Sealant, Disposing", page 40](#)

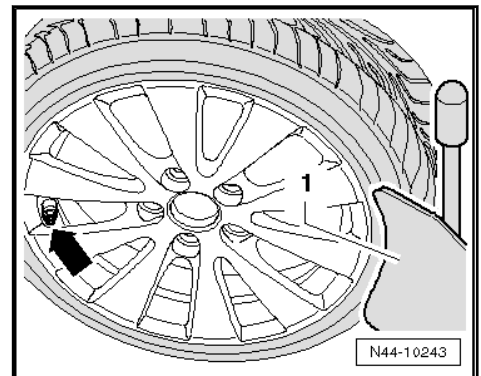
### 4.1 Tires, Dismounting

- Remove the valve insert.



#### Note

- ◆ *If equipped handle the glued-on wheel trim carefully. Surface slightly scratched.*
- ◆ *Replace the damaged rim wheel trim.*
- Place the press-off blade -1- over the tire valve -arrow- and maximum 2 cm away from rim flange.
- Remove the balance weight and any coarse dirt from the rim.

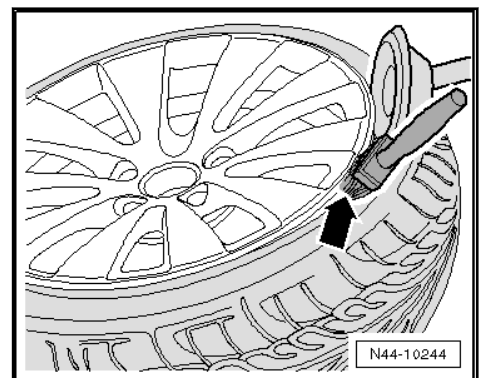


- Press off both tire beads all the way around and thoroughly apply tire mounting paste between the tire and rim flange -arrow-.



#### Note

*Avoid strong braking or acceleration maneuvers during the first 100 to 200 km (62.1 to 124.3 miles). Otherwise due to the tire mounting paste the tires can distort on the rim.*



### 4.2 Tire Sealant, Removing

- Place the wheel on a flat surface.
- Remove the valve insert.



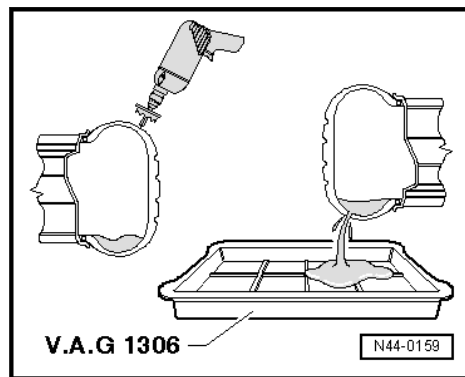
### ⚠ CAUTION

**Tire sealant is harmful to health.**

**Eye and skin irritation as well as allergies are possible.**

- **Wear safety gloves.**
- **Wear protective eyewear.**

- Using a drill or cutting bit, carefully drill a hole in the tire shoulder area.
- Hold the wheel over a drip tray and let the sealant flow out.
- Remove the tire from the rim.
- Clean the rim.



## 4.3 Tires, Dismounting

⇒ **"4.3.1 Tires, Dismounting, Wheels without and with Tire Pressure Monitoring System", page 22**

⇒ **"4.3.2 Tires, Dismounting, Run-Flat Tires, Ultra High Performance Tires", page 23**

### 4.3.1 Tires, Dismounting, Wheels without and with Tire Pressure Monitoring System

- If equipped check the tire pressure monitoring sensor with the vehicle diagnostic tester and if necessary replace.

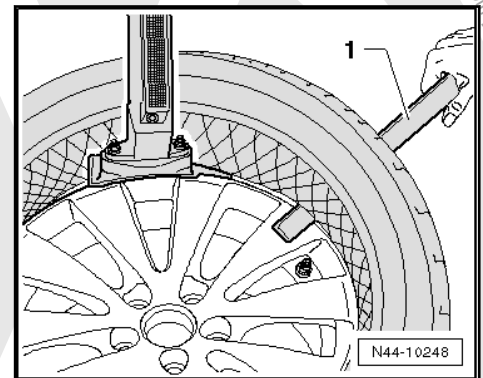
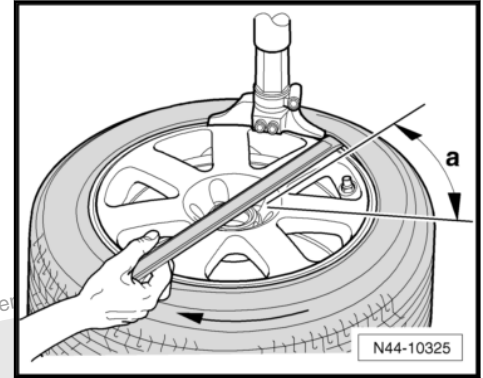


#### Note

- ◆ *When cleaning disc wheel (rim), the tire pressure monitoring sensor (if equipped) must not come into contact with water or be blown with compressed air.*
- ◆ *If equipped handle the glued-on wheel trim carefully. Surface slightly scratched.*
- ◆ *Replace the damaged rim wheel trim.*
- Place the wheel with tire on the tire dismounting/mounting machine.



- Turn the wheel until the tire valve or the tire pressure monitoring sensor is a minimum of 30° before the mounting head.
- Pry the upper tire bead with the tire iron over the mounting finger.
- Remove the tire iron.
- Let tire mounting device run clockwise until upper tire bead lies completely above the rim flange.
- Turn the wheel until the tire valve or the tire pressure monitoring sensor is a minimum of 30° before the mounting head.
- Pry the lower tire bead with the tire iron over the mounting finger.
- Insert the plastic mounting lever.
- Remove the tire iron.
- Hold the lower tire bead from the outside above the wheel rim flange with the plastic lever -1-. Let the tire mounting device run clockwise until the tire is completely off the wheel rim.



#### Note

- ◆ Check the tire pressure monitoring sensor for loose or damaged parts. If the threaded connections are loose, the union nut, valve insert, seal, sealing washer and valve cap must be replaced with new parts from the repair kit. Refer to ⇒ *Electronic Parts Catalog (ETKA)*.
- ◆ Replace the tire pressure monitoring sensor if damaged. Refer to ⇒ *"5.4.1 Tire Pressure Monitoring Sensor with Valve, Removing and Installing", page 55*.

### 4.3.2 Tires, Dismounting, Run-Flat Tires, Ultra High Performance Tires

- Only trained personnel can perform the assembly work on run-flat tires and ultra high performance tires.
- If equipped check the tire pressure monitoring sensor with the vehicle diagnostic tester and if necessary replace.

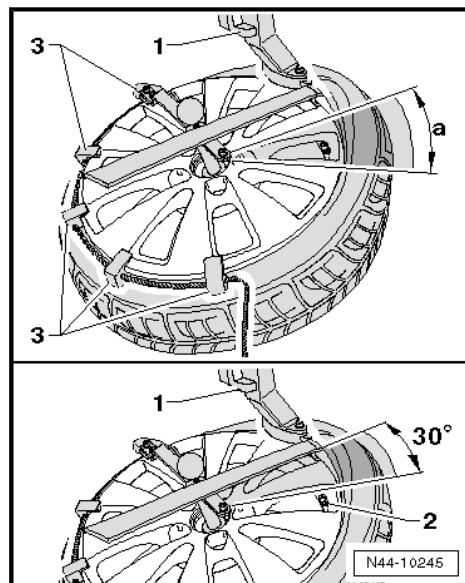


#### Note

- ◆ When cleaning disc wheel (rim), the tire pressure monitoring sensor must not come into contact with water or be blown with pressurized air.
- ◆ If equipped handle the glued-on wheel trim carefully. Surface slightly scratched.
- ◆ Replace the damaged rim wheel trim.

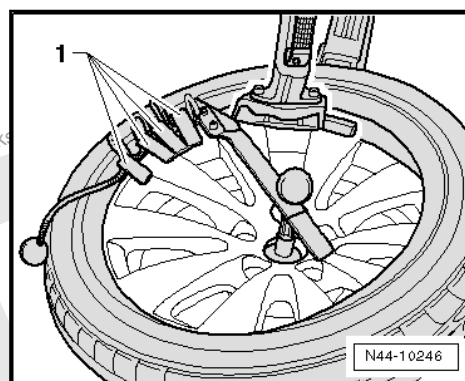


- Turn the wheel until the tire valve or the tire pressure monitoring sensor is a minimum of 30° before the mounting head.
- Insert the hold-down device -3- aligned with the mounting head -1- on the window edge.
- Pry the upper tire bead with the tire iron over the mounting finger.
- Remove the tire iron.

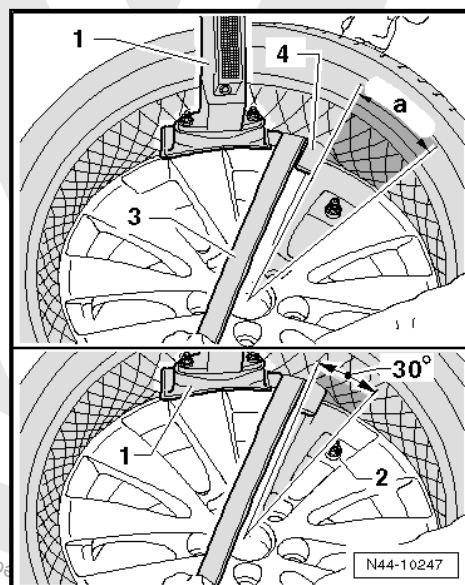


- Let tire mounting device run clockwise until upper tire bead lies completely above the rim flange.

This slides the hold-down device -1- against the mounting head. This allows them to be removed again easily.



- Turn the wheel until the tire valve or the tire pressure monitoring sensor is a minimum of 30° before the mounting head.
- Now lift the tire bead over the mounting finger of mounting head using tire iron -3-.
- Pry the lower tire bead with the tire iron over the mounting finger.
- Insert the plastic mounting lever -4-.
- Remove the tire iron -3-.



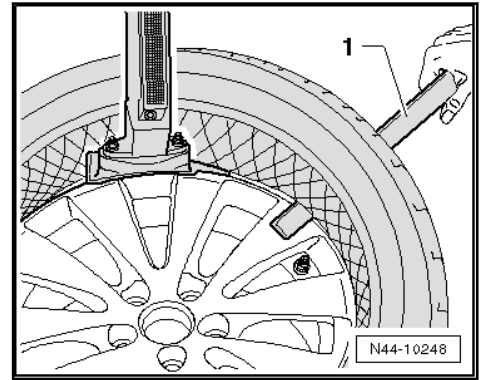


- Hold the lower tire bead from the outside, above the rim flange, using the plastic lever -1- and let the tire mounting device run clockwise, until the tire is completely off the wheel rim.



#### Note

- ◆ Check the tire pressure monitoring sensor for loose or damaged parts. If the threaded connections are loose, the union nut, valve insert, seal, sealing washer and valve cap must be replaced with new parts from the repair kit. Refer to ⇒ *Electronic Parts Catalog (ETKA)*.
- ◆ Replace the tire pressure monitoring sensor if damaged. Refer to ⇒ *"5.4.1 Tire Pressure Monitoring Sensor with Valve, Removing and Installing", page 55*.



## 4.4 Tires, Bringing to Mounting Temperature



### NOTICE

Risk of damage near the tire bead when mounting cold tires.

- The center of the tire must meet the minimum mounting temperature of 15 °C to 30 °C (59 °F to 86 °F).



### NOTICE

There is a risk of damaging tires with strong heat.

- Only warm up tires with warm water or warm air (maximum 50 °C (122 °F)).

Warm up cold tires to the minimum mounting temperature



#### Note

*This also applies to ultra high performance tires (height- / width ratio smaller/same as 45% and speed rating symbol larger than/same as V).*

- Store tires in rooms with a room temperature of at least 15°C (59 °F) before installing.
- The minimum mounting temperature of a tire must be between 15 °C and 30 °C (59 °F and 86 °F) in the center of the tire.
- For injury-free mounting, the upper sidewall and the upper bead inside must be minimum 15 °C.
- The internal temperature is called the core temperature.
- Rubber is a poor heat conductor. For this reason, a cold tire must be exposed to a temperature controlled environment until the inner rubber layers have warmed up to at least 15°C (59 °F).
- The temperature of the tire surface during the warm-up phase should not be considered as the temperature on the inside of the tire.
- Do not stack tires one on top of the other so that cold tires can absorb the warmth from the outside air quickly. They



should be stored separately so that the warm air can “flow” around them.

- Never use a room heater or a hot air gun to warm up tires because the surface temperature will heat up very quickly to a critical temperature.
- Using warm water or warm air (maximum 50 °C (122 °F)) is the only way to warm a tire safely.
- If cold tires (below 0 °C) are brought into a warm room (above 0 °C), a layer of ice will start to form on the tires. This layer of ice means that humidity in the warm air is condensing on the tire.
- Once the layer of ice starts to melt, water will start to build. Wipe up the water with a cloth so that the warming process does not slow down.

#### Warm-up time:

- ◆ Tires warmer than 0 °C (32 °F) must be stored at minimum 19 °C (66.2 °F) for at least 2 hours.
- ◆ Tires colder than 0 °C (32 °F) must be stored at minimum 19 °C (66.2 °F) for at least 2.5 hours.

#### Recommendations:

- ◆ If possible, let the tires stand in the workshop for 1 day before mounting them.
- ◆ Store them on an insulated surface, a wood pallet or something similar.
- ◆ Position the tires so that they can be “surrounded” by the warm air.
- ◆ Wipe off the sweat
- ◆ Never heat the tires with a room heater or a hot air gun!

## 4.5 Tires, Mounting

⇒ [“4.5.1 Tires, Mounting, Wheels without and with Tire Pressure Monitoring System”, page 26](#)

⇒ [“4.5.2 Tires, Mounting, Run-Flat Tires and Ultra High Performance Tires”, page 29](#)

### 4.5.1 Tires, Mounting, Wheels without and with Tire Pressure Monitoring System

Note the legal requirements for vehicles with tire pressure monitoring system starting from 11/01/2014. Refer to ⇒ [“2.1.2 Vehicles with Tire Pressure Monitoring System”, page 9](#) .

- Only trained personnel can perform the assembly work on run-flat tires.
- If equipped check the tire pressure monitoring sensor with the vehicle diagnostic tester and if necessary replace.
- Bring the tires to the mounting temperature. Refer to ⇒ [“4.4 Tires, Bringing to Mounting Temperature”, page 25](#) .





#### Note

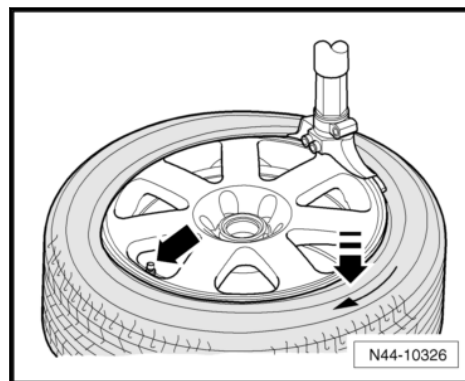
- ◆ *When cleaning disc wheel (rim), the tire pressure monitoring sensor (if equipped) must not come into contact with water or be blown with compressed air.*
- ◆ *If equipped handle the glued-on wheel trim carefully. Surface slightly scratched.*
- ◆ *Replace the damaged rim wheel trim.*
- Clean the rim.
- Insert the new tire valve with the Valve Fitting Tool - VAS 6459- .
- Coat the rim flanges, tire beads and inside of upper tire beads thoroughly with tire mounting paste.
- Place the inner side of the tire on the rim.







- Turn the rim until the tire valve of the tire pressure monitoring sensor aligns with the mounting head.
- Push the tires between the tire valve or the tire pressure monitoring sensor and the mounting head into the bed -direction of arrow-.
- Let the tire dismounting/mounting machine run clockwise until the mounting head is in front of the tire valve or the tire pressure monitoring sensor. Slide the lower tire bead over the rim flange.
- Turn the rim until the tire valve of the tire pressure monitoring sensor aligns with the mounting head.
- Let the tire dismounting/mounting machine run clockwise until the mounting head is in front of the tire valve or the tire pressure monitoring sensor. Slide the upper tire bead over the rim flange.



### ⚠ CAUTION

High spring pressure when filling tire.

Risk of injury from tire/rim fragments.

- Wear protective eyewear.
- Set the spring pressure up to the maximum of 3.3 bar (47.86 psi).

### ! NOTICE

There is a risk of damaging the rim due to too high spring pressure.

- Set the spring pressure up to the maximum of 3.3 bar (47.86 psi).
- Inflate the tire to maximum pressure of 3.3 bar (47.86 psi) (spring pressure).
- If tire beads do not make contact completely on disc wheel edge, then release air, press off tire bead once more and coat rim flange thoroughly again with tire mounting paste.
- When the tire bead makes contact on the bead seat, increase the pressure to 4 bar (58.02 psi).
- If the tire bead does not make complete contact with the bead seat, dismount the tire and mount it again. Refer to ⇒ [“4.3.1 Tires, Dismounting, Wheels without and with Tire Pressure Monitoring System”, page 22](#).
- Turn the valve insert.
- Fill the tire with the specified tire pressure.
- Balance the tire. Refer to ⇒ [“4.9 Wheel, Balancing”, page 35](#).



### Note

Avoid strong braking or acceleration maneuvers during the first 100 to 200 km (62.1 to 124.3 miles). Otherwise due to the tire mounting paste the tires can distort on the rim.



## 4.5.2 Tires, Mounting, Run-Flat Tires and Ultra High Performance Tires

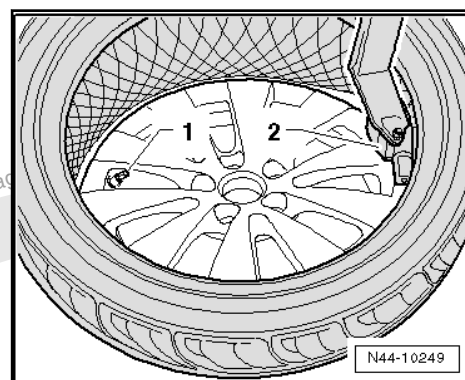
Note the legal requirements for vehicles with tire pressure monitoring system starting from 11/01/2014. Refer to ➤ [“2.1.2 Vehicles with Tire Pressure Monitoring System”, page 9](#) .

- Only trained personnel can perform the assembly work on run-flat tires and ultra high performance tires.
- If equipped check the tire pressure monitoring sensor with the vehicle diagnostic tester and if necessary replace.
- Bring the tires to the mounting temperature. Refer to ➤ [“4.4 Tires, Bringing to Mounting Temperature”, page 25](#) .

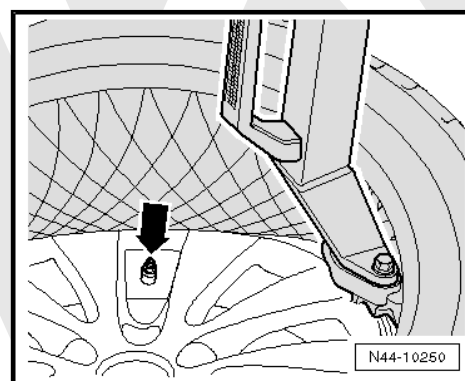


### Note

- ◆ *If equipped handle the glued-on wheel trim carefully. Surface slightly scratched.*
- ◆ *Replace the damaged rim wheel trim.*
- Clean the rim.
- Insert the new tire valve with the Valve Fitting Tool - VAS 6459- .
- Coat the rim flanges, tire beads and inside of upper tire beads thoroughly with tire mounting paste.
- Place the inner side of the tire on the rim.
- Turn the rim until the tire valve of the tire pressure monitoring sensor aligns with the mounting head.

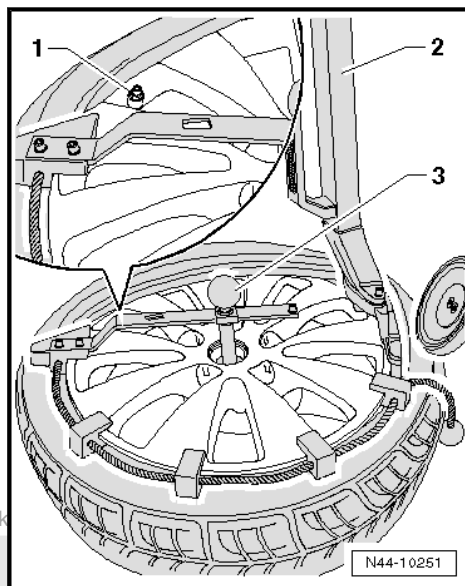


- Let the tire dismounting/mounting machine run clockwise until the mounting head is in front of the tire valve or the tire pressure monitoring sensor, -arrow-. Slide the lower tire bead over the rim flange.





- Turn the rim until the tire valve of the tire pressure monitoring sensor -1- aligns with the mounting head -2-.
- Install the hold-down device -3- on the rim.





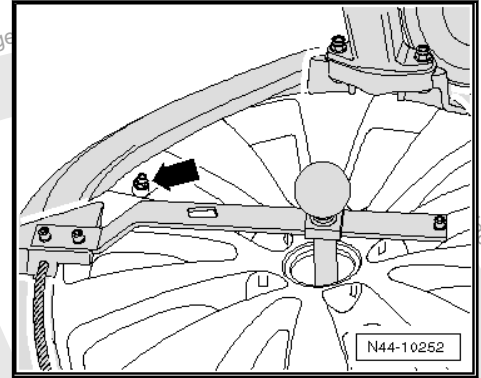
- Let the tire dismounting/mounting machine run clockwise until the mounting head is in front of the tire valve or the tire pressure monitoring sensor. Slide the upper tire bead over the rim flange.
- Remove the hold-down device from the wheel rim flange.

### CAUTION

High spring pressure when filling tire.

Risk of injury from tire/rim fragments.

- Wear protective eyewear.
- Set the spring pressure up to the maximum of 3.3 bar (47.86 psi).



### NOTICE

There is a risk of damaging the rim due to too high spring pressure.

- Set the spring pressure up to the maximum of 3.3 bar (47.86 psi).
- Inflate the tire to maximum pressure of 3.3 bar (47.86 psi) (spring pressure).
- If tire beads do not make contact completely on disc wheel edge, then release air, press off tire bead once more and coat rim flange thoroughly again with tire mounting paste.
- When the tire bead makes contact on the bead seat, increase the pressure to 4 bar (58.02 psi).
- If the tire bead does not make complete contact with the bead seat, dismount the tire and mount it again. Refer to [⇒ "4.3.2 Tires, Dismounting, Run-Flat Tires, Ultra High Performance Tires", page 23](#).
- Turn the valve insert.
- Fill the tire with the specified tire pressure.
- Balance the tire. Refer to [⇒ "4.9 Wheel, Balancing", page 35](#).

### Note

*Avoid strong braking or acceleration maneuvers during the first 100 to 200 km (62.1 to 124.3 miles). Otherwise due to the tire mounting paste the tires can distort on the rim.*

## 4.6 Tires and Rims, Matching

- If necessary, repair flat spots from standing. Refer to [⇒ "10.4 Flat Spots, Correcting", page 118](#).
- Dismount the tire. Refer to [⇒ "4.1 Tires, Dismounting", page 21](#).
- Turn the tire um 180° against the rim.
- Inflate the tire to 4 bar (58.02 psi).
- Tension the wheel with the tire on the balancing machine.
- Check the tire and wheel radial and lateral run-out. Refer to [⇒ "4.7.2 Wheels and Tires, Radial and Lateral Run Out, Checking with Tire Dial Gauge", page 33](#).



- If the radial and lateral run-out are within the specified values, balance the wheel to 0. Refer to [⇒ page 32](#).
- If the radial and lateral run-out are outside the specified values, match the tire and rim again and rotate the tire 90° relative to the rim.
- Check the tire and wheel radial and lateral run-out again. Refer to [⇒ “4.7.2 Wheels and Tires, Radial and Lateral Run Out, Checking with Tire Dial Gauge”, page 33](#).
- If the radial and lateral run-out are within the specified values, balance the wheel to 0. Refer to [⇒ page 32](#).
- If the radial and lateral run-out are outside the specified values, match the tire and rim again and rotate the tire 180° relative to the rim.
- Check the tire and wheel radial and lateral run-out again. Refer to [⇒ “4.7.2 Wheels and Tires, Radial and Lateral Run Out, Checking with Tire Dial Gauge”, page 33](#).
- If the radial and lateral run-out are within the specified values, balance the wheel to 0. Refer to [⇒ page 32](#).
- If the radial and lateral run-out are still outside the specified values check the rim for radial and lateral run-out. Refer to [⇒ “4.9.4 Rim Radial and Lateral Run-Out, Checking”, page 39](#).
- In the radial and lateral run-out of the rim is within the specified values, replace the tire.

## 4.7 Tire and Wheel Radial and Lateral Run-Out, Checking

[⇒ “4.7.1 Tire and Wheel Radial and Lateral Run-Out, Checking, Tolerances”, page 32](#)

[⇒ “4.7.2 Wheels and Tires, Radial and Lateral Run Out, Checking with Tire Dial Gauge”, page 33](#)

### 4.7.1 Tire and Wheel Radial and Lateral Run-Out, Checking, Tolerances

Radial and lateral run-out occur when the wheel and tire are not running precisely true.

For technical reasons, 100% true running is not possible.

Therefore the manufacturers of these components allow a precisely specified tolerance.

Mounting the tire in a unfavorable position on the wheel can be the cause for exceeding the maximum allowed tolerance for wheel with tire.

The maximum permitted tolerances for the wheel with tire can be found in the table.

#### Tolerances for radial and lateral run-out of rim with tire

Rim with tire	Radial run-out (mm)	Lateral run-out (mm)
Passenger Vehicle	0.9	1.1 (1.3 near the lettering)



## 4.7.2 Wheels and Tires, Radial and Lateral Run Out, Checking with Tire Dial Gauge

### Checking lateral run-out

- Preload the Tire Pressure Gauge approximately 2 mm.
- Position the Tire Pressure Gauge on the side wall of the tire.
- Rotate the wheel slowly.
- Note the smallest and the largest dial readings.



#### Note

*If the difference is greater than 1.3 mm, the lateral run-out is too great.*

By matching, the lateral run-out can be reduced. Refer to ➤ [“4.8 Wheels and Tires, Matching”, page 33](#).

Peak values on the Tire Pressure Gauge due to small irregularities in the rubber may be disregarded.

### Checking radial run-out

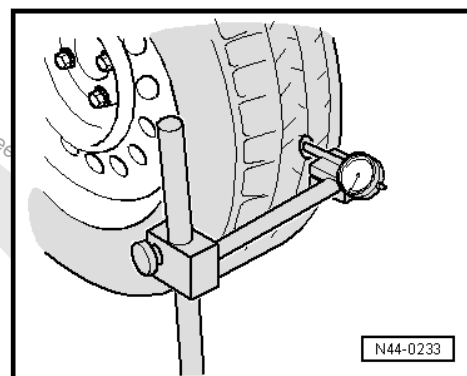
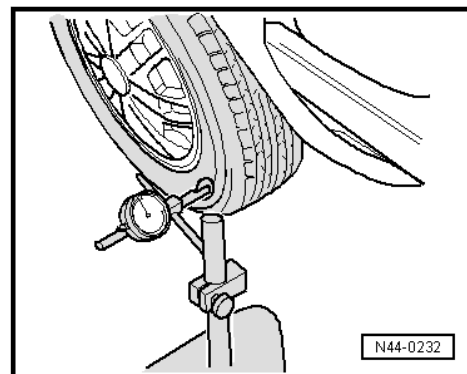
- Preload the Tire Pressure Gauge approximately 2 mm.
- Position the Tire Pressure Gauge on the tire treads.
- Rotate the wheel slowly.
- Note the smallest and the largest dial readings.



#### Note

*If the difference is greater than 1 mm, the radial run-out is too great.*

By matching, the radial run-out can be reduced. Refer to ➤ [“4.8 Wheels and Tires, Matching”, page 33](#).



## 4.8 Wheels and Tires, Matching

### General Information

If radial or lateral run-out from rim or tire meet each other, the untrue running of the wheel and tire is increased.

For technical reasons, 100% true running is not possible. Refer to ➤ [“4.7.1 Tire and Wheel Radial and Lateral Run-Out, Checking, Tolerances”, page 32](#).

### Work procedure for match-mounting

- Warm up tires by driving. This way existing flat spot from standing can be removed. Refer to ➤ [“11.1 Flat Spots”, page 120](#).
- Let the air out of the tire.
- Remove the tire bead from the wheel rim flange.
- Coat the tire bead all the way around with Tire Mounting Paste.
- Turn the tire um 180° against the rim.





- Inflate the tire to approximately 4 bar (58.02 psi).
- Tension the wheel with the tire on the balancing machine.
- Check the run-out or the radial and lateral run-out, as necessary.



#### Note

- ◆ *If the radial and lateral run-out value is not exceeded, the wheel can be balanced to 0 grams. Specifications are found on [⇒ page 32](#).*
- ◆ *If the radial and lateral run-out lies outside the specified values, the tire must be turned again.*
- Let the air out and remove the tire beads from the wheel rim flanges.
- Rotate the tire 90° (one quarter of a turn) relative to the rim.
- Inflate the tire to 4 bar (58.02 psi) again and check the run-out.



#### Note

- ◆ *If the radial and lateral run-out value is not exceeded, the wheel can be balanced to 0 grams.*
- ◆ *If the radial and lateral run-out is still outside the specified values, the wheel must be turned again.*
- Press the tire beads off the rim flanges.
- Rotate the tire 180° (half a turn) relative to the rim.

If the values for radial or lateral run-out are still outside the specified values, check the rim for radial and lateral run-out. Refer to [⇒ "4.9.4 Rim Radial and Lateral Run-Out, Checking", page 39](#).

If the measured values for radial and lateral run-out of the rim are within the specified values, then the tire has excessive radial or lateral run-out. In this case, the tire must be replaced.



#### Note

- ◆ *Assembly paste from mounting tires is located between tires and rim flanges.*
- ◆ *Avoid strong braking or acceleration maneuvers during the first 100 to 200 km (62.1 to 124.3 miles). Otherwise the tires can turn on the rim. Then the work would then be undone.*





## 4.9 Wheel, Balancing

⇒ [“4.9.1 Conditions”, page 35](#)

⇒ [“4.9.2 Wheel, Balancing on Stationary Balancing Machine”, page 35](#)

⇒ [“4.9.3 Wheel, Balancing with Fine Balancing Machine \(Finish Balancer\)”, page 38](#)

⇒ [“4.9.4 Rim Radial and Lateral Run-Out, Checking”, page 39](#)

### 4.9.1 Conditions

Before beginning balancing, the following requirements must be fulfilled.

- The tire pressure must be OK.
- The tire tread must not be worn down on one side and should be at least 4 mm deep.
- The tires must not have any damage such as cuts, holes, foreign bodies, etc.
- The suspension and steering, including the shock absorber, must be in perfect condition.
- A road test has been performed.

### 4.9.2 Wheel, Balancing on Stationary Balancing Machine

Before beginning balancing, the following requirements must be fulfilled.

- The tire pressure must be OK.
- The tire tread must not be worn down on one side and should be at least 4 mm deep.
- The tires must not have any damage such as cuts, holes, foreign bodies, etc.
- The suspension and steering, including the shock absorber, must be in perfect condition.
- Test drive performed. Refer to ⇒ [“10.3.2 Vibration, Road Test, Performing Before Balancing”, page 117](#) .



#### Note

- ◆ *If equipped handle the glued-on wheel trim carefully. Surface slightly scratched.*
- ◆ *Replace the damaged rim wheel trim.*
- ◆ *Only use the Wheel Balancer Clamping Plate - VAS 6652- and Thrust Pin - VAS 6652/1- .*

#### Tension the wheel on balancing machine

Dirt and rust in the area of the contact surfaces and centering of the wheel distort the result.

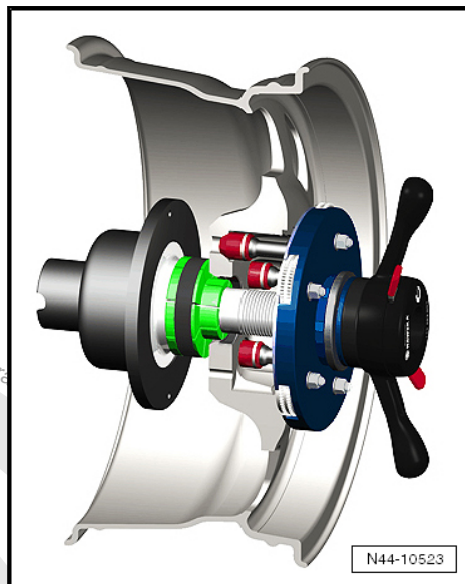
- Clean the contact surfaces, centering seat and wheel disc using the Pneumatic Brush Grinder Set - VAS 6446- before tensioning wheel on balancing machine!



#### Note

*The wheel balancing machine must use the correct system for centering and tensioning the tires when replacing them. Reference the information for the Wheel Balancing Machine Centering System before beginning any work.*

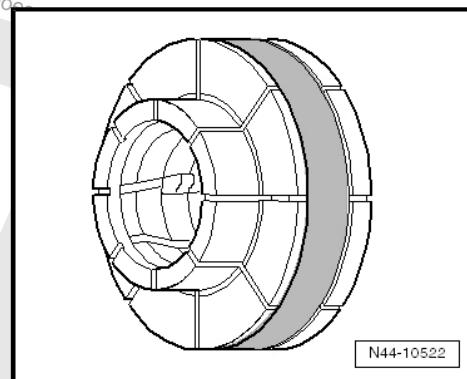
- Tension the wheel with the tire on the balancing machine.





#### Note

- ◆ Use the *Wheel Centering System Adapter - 57mm - VAS 6685-*, for example, to mount the wheel on the balancer.
- ◆ This way a 100% centering of the wheel and gentle tensioning is possible!
- ◆ It is not possible to center it 100% on balancing machine with conical tensioners.
- ◆ With a deviation of 0.1 mm outside the center, there is an imbalance of 10 grams on the wheel/tire.



#### Wheel/tire balancing procedure

- Let the wheel/tire turn on the balancing machine.
- Check the run of the characteristic curves on the sidewall of the tire in the area of the rim flange.
- Check the tire wear pattern while the wheel/tire is turning.



#### Note

*In the event of one-sided wear, wear spots from braking or severe flattening, smooth running cannot be achieved by balancing. In this case, the tire must be replaced.*

- Check the run-out on the wheel/tire. If the wheel with tire runs untrue, although there are no flat spots, a radial run-out or lateral run-out may be the cause.
- Check the wheel with tire for radial and lateral run-out. Refer to ➤ ["4.7.2 Wheels and Tires, Radial and Lateral Run Out, Checking with Tire Dial Gauge", page 33](#).
- If the radial and lateral run-out are within the specified tolerance, balance the wheel and tire.



#### Note

- ◆ On vehicles without tire pressure monitoring sensors do not use more than 60 gram weight per rim flange.
- ◆ On vehicles with tire pressure monitoring sensors do not use more than 90 gram weight per rim flange.
- ◆ If more weight is necessary, a smoother running can be achieved by matched mounting of the tire. Matching a tire. Refer to ➤ ["4.6 Tires and Rims, Matching", page 31](#).
- ◆ Hunter RFT33VAG Road Force Touch™ Wheel Balancer - VAS 6230B4- can be inserted as an alternative to matching. Refer to ➤ ["10.3.3 Vibration, Vibration Control System", page 118](#).
- Install the wheel on the vehicle.



**NOTICE**

**Ceramic brake destruction due to removal/installation of the wheel.**

- To remove/mount a wheel, install the long drift instead of the wheel bolts at the topmost position (12 o'clock position) and insert the short drift in the wheel bolt mounts for support.
- Tighten the lowest wheel bolt by hand to approximately 30 Nm.
- Tighten the remaining wheel bolts diagonally to approximately 30 Nm. This process centers the wheel on the wheel hub.
- Set the vehicle on its wheels.
- Use a torque wrench to tighten the wheel bolts diagonally to the specified tightening specification.
- Perform a road test.

If a vibration is still detected during the road test, the cause may be due to tolerance in the wheel centering.

The component tolerances of wheels and wheel hubs can be additive in unfavorable cases. Vibration can result from this.

This can be eliminated using a finish balancer. Refer to ➤ [“4.9.3 Wheel, Balancing with Fine Balancing Machine \(Finish Balancer\)”, page 38](#) .

### 4.9.3 Wheel, Balancing with Fine Balancing Machine (Finish Balancer)

Before beginning balancing, the following requirements must be fulfilled.

- The tire pressure must be OK.
- The tire tread must not be worn down on one side and should be at least 4 mm deep.
- The tires must not have any damage such as cuts, holes, foreign bodies, etc.
- The suspension and steering, including the shock absorber, must be in perfect condition.
- Test drive performed. Refer to ➤ [“10.3.2 Vibration, Road Test, Performing Before Balancing”, page 117](#) .



**Note**

- ◆ *If equipped handle the glued-on wheel trim carefully. Surface slightly scratched.*
- ◆ *Replace the damaged rim wheel trim.*
- ◆ *Only use the Wheel Balancer Clamping Plate - VAS 6652- and Thrust Pin - VAS 6652/1- .*



#### Note

- ◆ *Working with a Fine Balancing Machine requires instruction from the manufacturer of the balancer.*
- ◆ *When balancing, place the wheels of the driven axle on the turntable sensors. On a FWD vehicle, the front wheels must be on the sensors. On AWD vehicles, all four wheels must be on the sensors.*

If it is determined when balancing on the vehicle the residual imbalance is more than 20 grams, the wheel should be rotated on the wheel hub.

- Mark the point at which the imbalance is indicated.
- Afterwards, unbolt the wheel and rotate its position on the wheel hub so that the marked positions point downward.



#### Note

*The wheel hub must not turn during this procedure.*

- First, tighten the lowest wheel bolt hand-tight to approximately 30 Nm.
- Tighten the remaining wheel bolts diagonally to approximately 30 Nm. This process centers the wheel properly on the wheel hub.
- Check again whether the imbalance is less than 20 grams using the fine balancing machine.



#### Note

*The imbalance should not be smaller than 20 grams under any circumstances before changing balance weight.*

- Loosen the wheel bolts again, if necessary.
- Rotate the wheel relative to the wheel hub once more by one or two wheel bolt holes.
- Tighten the wheels according to the method described above.



#### Note

*Only if the imbalance is less than 20 grams should the imbalance be reduced by changing the balance weight.*

- Balance the wheels until the imbalance is below 5 grams.
- Tighten the wheel bolts to the specified tightening specification if not already done.

**Always tighten the wheel bolt to the tightening specification and using the torque wrench.**

## 4.9.4 Rim Radial and Lateral Run-Out, Checking

- Mount the rim on the Balancing Machine .



- Use the Wheel Centering System Adapter - 57mm - VAS 6685- 1).

- Preload the Tire Pressure Gauge approximately 2 mm.
- Turn the rim slowly.
- Note the smallest and the largest dial readings.

S - Lateral Run-Out

H - Radial Run-Out

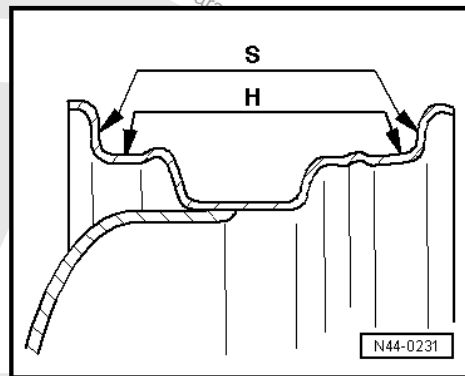
- Compare the determined value with the specifications in the table. Refer to ➔ [page 40](#) .

1) Depending on the center hole diameter of the rim holes, different tools are to be used.



#### Note

Peak values on the Tire Dial Gauge due to small irregularities may be disregarded.



#### Specified values for radial and lateral run-out on the rim

Rim	Radial run-out (mm)	Lateral run-out (mm)
Steel wheel	0.5	0.5
Light alloy wheel	0.5	0.8



#### Note

If the measured value exceeds the specified value, no acceptable smooth running can be attained.

## 4.10 Tire Sealant, Disposing

- ◆ Tire sealant or residue from it must not be mixed with other wastes/fluids
- ◆ Accumulating fluid residue from tire sealant must be collected and placed in a plastic container. The plastic containers can be sent for recycling together with the tire sets (if the expiration date has passed).
- ◆ The return or recycling can take place using the existing workshop disposal systems
- ◆ Check with the company responsible for trash pickup for the importer.



## 5 Tire Pressure Monitoring System

⇒ [“5.1 System Description - Tire Pressure Monitoring System”, page 41](#)

⇒ [“5.2 Component Location Overview - Tire Pressure Monitoring System”, page 45](#)

⇒ [“5.3 Overview - Tire Pressure Monitoring Sensor”, page 49](#)

⇒ [“5.4 Tire Pressure Monitoring Sensors G222 / G223 / G224 / G225 , Removing and Installing”, page 55](#)

⇒ [“5.5 Tire Pressure Monitoring Control Module J502 , Removing and Installing”, page 61](#)

⇒ [“5.6 Transmitter in Wheel Housing for Tire Pressure Monitoring System, Removing and Installing”, page 69](#)

### 5.1 System Description - Tire Pressure Monitoring System

⇒ [“5.1.1 System Description - Tire Pressure Monitoring System, Indirect Measurement System \(Tire Pressure Monitoring System\)”, page 41](#)

⇒ [“5.1.2 System Description - Tire Pressure Monitoring System, Direct Measurement System \(Tire Pressure Monitoring System\)”, page 43](#)

⇒ [“5.1.3 Button Functions - Tire Pressure Monitoring System, Direct Measurement System \(Tire Pressure Monitoring System\)”, page 43](#)

⇒ [“5.1.4 Tire Pressure Monitoring System with Auto-Location Description”, page 44](#)

#### 5.1.1 System Description - Tire Pressure Monitoring System, Indirect Measurement System (Tire Pressure Monitoring System)

The system must be reprogrammed after every wheel mounting, regardless of whether it is at the same position or it is for a different wheel.

**These statements refer to legal requirements in the European Union. No claims are made as to their completeness.**

#### General Information

The tire pressure monitoring system is included in the software in the ABS Control Module - J104- . The system will recognize a slow and gradual decrease in tire pressure on a wheel. The DTC memory entries for tire pressure monitoring system are stored in the ABS Control Module - J104- . With the help of the ABS speed sensor, the TPMS compares the speed and rolling circumference of the individuals tires.

After the following work and/or changes and with the ignition switched on, the Tire Pressure Monitoring Display Button - E492- must be pressed until the confirmation chime sounds:

- ◆ Change in the tire pressures
- ◆ A change in one or more tires
- ◆ Changing a tire, for example, from front to rear
- ◆ Removing or installing one or multiple tires





If a tire has changed in circumference, the Tire Pressure Monitoring Display Indicator Lamp - K220- in the instrument cluster will turn on. Rolling circumference of a tire may change due to:

- ◆ Insufficient tire pressure
- ◆ Structural damage on tires
- ◆ Vehicle is loaded heavily on one side
- ◆ High load on one axle, when towing trailer for example
- ◆ When snow chains are used
- ◆ Spare wheel is mounted
- ◆ One wheel is replaced

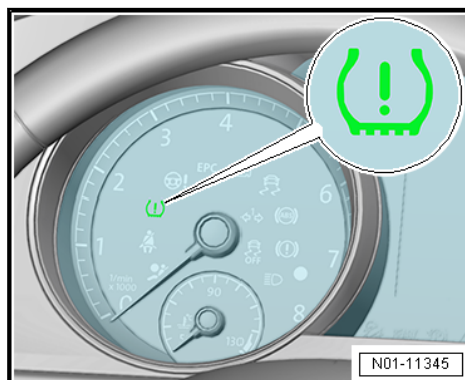
### System malfunction in the ABS

If the ASR/ESP Indicator Lamp - K155- indicates a malfunction in the ABS system, then the Tire Pressure Monitoring Display Indicator Lamp - K220- will also turn on. A malfunction in the tire pressure monitoring system has not been stored.

The indicator lamp cannot be erased. In this case, perform the following steps:

- Connect the ➤ Vehicle diagnostic tester and select “Guided Fault Finding” on the ➤ Vehicle diagnostic tester.

Follow the instructions on the screen to perform the basic setting.



### Note

*Depending on the vehicle the basic setting is performed in different ways.*

### Basic Setting with the Infotainment System, Performing

- Switch the ignition on.
- Switch on the Infotainment system.
- Press the Infotainment button **CAR**.
- Press **Setup**.
- Press **Tires**.
- Press **Set**.
- Press **Confirm**.

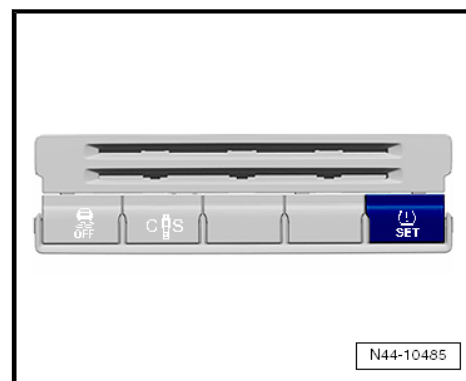
### Perform the basic setting with the **SET** button.

- The ignition must be on.
- The vehicle must be standing and the parking brake must be set.



- Press the **SET** button in the center console until the signal tone sounds.

The signal tone confirms the basic setting.



### 5.1.2 System Description - Tire Pressure Monitoring System, Direct Measurement System (Tire Pressure Monitoring System)

- ◆ When replacing vehicle wheels installed at the factory, please make sure the new wheels are equipped with tire pressure monitoring sensors that are compatible with the factory installed tire pressure monitoring system. Refer to ➤ ["5.4 Tire Pressure Monitoring Sensors G222 / G223 / G224 / G225 , Removing and Installing", page 55](#) .
- ◆ New wheels with tire pressure monitoring sensors are detected and integrated in the system. To detect the new wheels, the vehicle must be driven for some time at speeds above 25 km/h (15.5 mph) (15 mph).
- ◆ When replacing and retrofitting tire pressure monitoring sensors, a new valve set and seal set must always be used. Refer to the ➤ Electronic Parts Catalog (ETKA) .
- ◆ Mounted wheels that do not have tire pressure monitoring sensors are have sensors that are incompatible, cannot detect the tire pressure monitor. The tire pressure monitoring system is then incapable of measuring the tire pressure. A malfunction is displayed or the system switches off.

These statements refer to legal requirements in the European Union. No claims are made as to their completeness.

### 5.1.3 Button Functions - Tire Pressure Monitoring System, Direct Measurement System (Tire Pressure Monitoring System)

#### Vehicles without Infotainment system

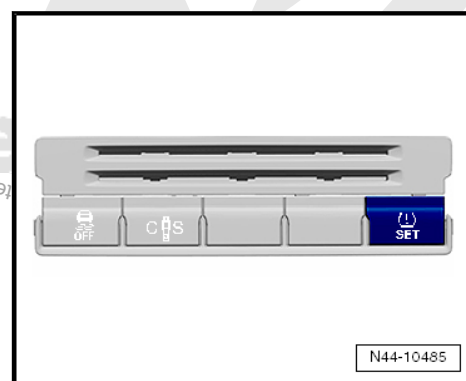
Use the **SET** button in the center console to switch between full and partial load, to check the status and to switch tire pressure monitoring on or off.



#### Note

*This button is not for the North American region (NAR).*

Messages and warnings are shown via lights in instrument panel and texts in instrument panel display.





This table lists the function of buttons under various conditions/actions in regard to various functions.

	Length of time button is held pressed			
	up to 2 seconds	3 to 7 seconds	8 to 10 seconds	11 to 15 seconds
Condition/action	Current condition	Switching	Confirming	Switching off
	Messages:	Messages:	Messages:	Messages:
Desired functions:				
Switch from full to partial load	Tire full load monitored (gong)	Tire partial load on.	When released: Gong confirms switch	
Switch from partial to full load	Tire partial load monitored (gong)	Tire full load on.	When released: Gong confirms switch	
Switching on	Tire pressure monitoring off.	Tire partial load on.	When released: Gong confirms switch	
Switching off	Tire full load monitored or Tire partial load monitored (gong)	Tire partial load on. or Tire full load on.		Tire pressure monitoring off. (gong)
Status check	For example: Tire pressure monitoring off. or Tire partial load monitored (gong)	After releasing: Press longer to switch on. or Press longer to switch or switch off.		

#### 5.1.4 Tire Pressure Monitoring System with Auto-Location Description

- ◆ The system uses sensors in the tires to report the air pressure to the Tire Pressure Monitoring Control Module - J502- .
- ◆ After a short drive, the system is able to display the tire pressures and warnings for the appropriate side in the instrument cluster through the "auto-location" function.
- ◆ The "intelligent antenna" is a combination of a tire pressure monitoring control module and a central receiving antenna.
- ◆ It is not necessary to perform a manual adapting after replacing the wheel electronics or after changing tires. The tire pressure monitoring system automatically recognized the tire pressure sensors and adapts them as soon as the vehicle drives off.



## 5.2 Component Location Overview - Tire Pressure Monitoring System

⇒ [“5.2.1 Component Location Overview - Tire Pressure Monitoring System \(TPMS\) with Auto-Location”, page 45](#)

⇒ [“5.2.2 Component Location Overview - Tire Pressure Monitoring System, Trigger”, page 46](#)

⇒ [“5.2.3 Component Location Overview - Tire Pressure Monitoring System, Auto Location”, page 48](#)

### 5.2.1 Component Location Overview - Tire Pressure Monitoring System (TPMS) with Auto-Location



#### Note

*The vehicle shown in the illustration is representative of all vehicles with the tire pressure monitoring system (TPMS) with Auto-location. It only serves to illustrate the component locations.*





#### 1 - Left Rear Tire Pressure Monitoring Sensor - G224-

- ❑ Removing and Installing. Refer to ➤ ["5.4 Tire Pressure Monitoring Sensors G222 / G223 / G224 / G225, Removing and Installing", page 55](#) .

#### 2 - Left Front Tire Pressure Monitoring Sensor - G222-

- ❑ Removing and Installing. Refer to ➤ ["5.4 Tire Pressure Monitoring Sensors G222 / G223 / G224 / G225, Removing and Installing", page 55](#) .

#### 3 - Right Front Tire Pressure Monitoring Sensor - G223-

- ❑ Removing and Installing. Refer to ➤ ["5.4 Tire Pressure Monitoring Sensors G222 / G223 / G224 / G225, Removing and Installing", page 55](#) .

#### 4 - Right Rear Tire Pressure Monitoring Sensor - G225-

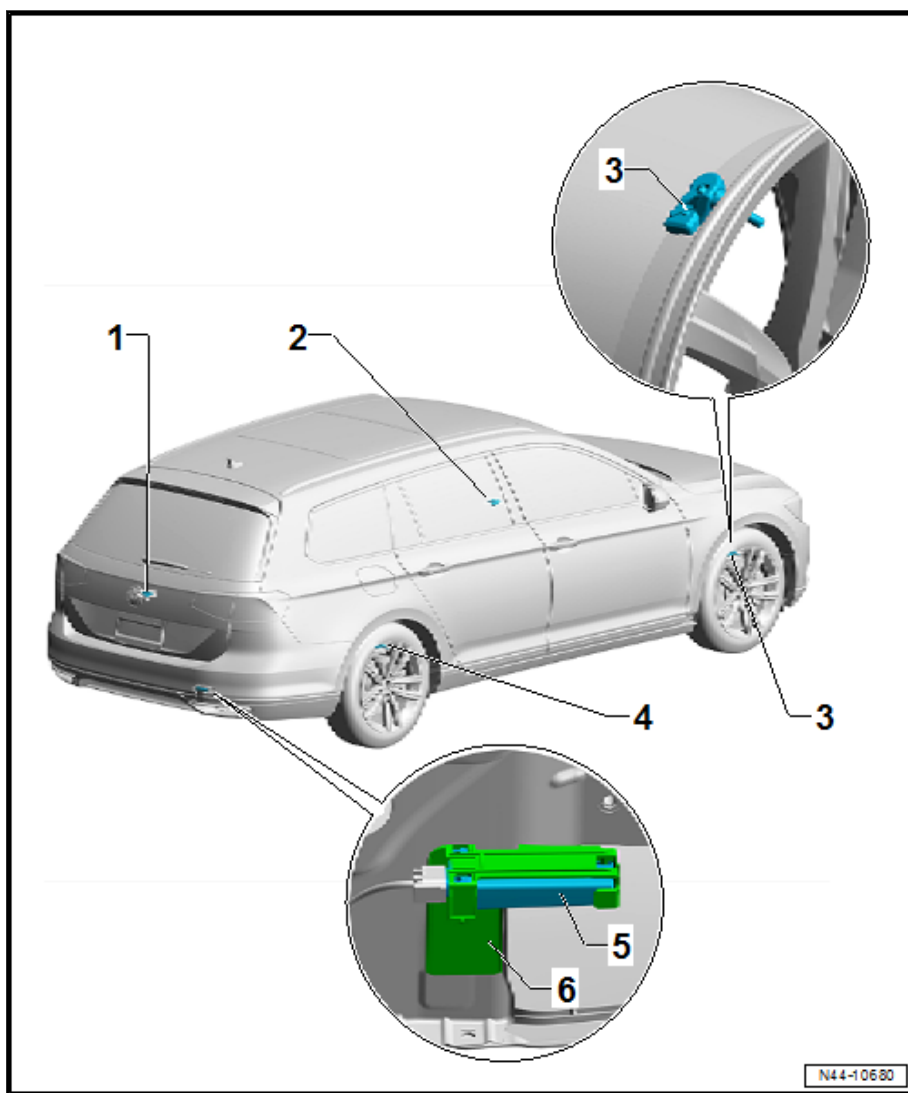
- ❑ Removing and Installing. Refer to ➤ ["5.4 Tire Pressure Monitoring Sensors G222 / G223 / G224 / G225, Removing and Installing", page 55](#) .

#### 5 - Tire Pressure Monitoring Control Module - J502-

- ❑ Removing and Installing. Refer to ➤ ["5.5 Tire Pressure Monitoring Control Module J502, Removing and Installing", page 61](#) .
- ❑ Component location: on the right rear back panel

#### 6 - Bracket for Tire Pressure Monitoring Control Module - J502-

- ❑ Removing and Installing. Refer to ➤ ["5.5 Tire Pressure Monitoring Control Module J502, Removing and Installing", page 61](#) .



Accept any liability with respect to the correctness of information in this document

## 5.2.2 Component Location Overview - Tire Pressure Monitoring System, Trigger



### Note

*The target pressures are stored in the Tire Pressure Monitoring Control Module - J502- and only need to be changed if the wheel dimensions have changed, for example if different summer or winter tires are installed. The system automatically learns new or different wheel electronics.*

### 1 - Right Front Tire Pressure Monitoring Sensor - G223-

- ❑ Removing and Installing. Refer to ➤ ["5.4.2 Tire Pressure Monitoring Sensor, Removing and Installing, without Valve, Version 1, Service Version", page 56](#) .

### 2 - Right Front Tire Pressure Monitoring Transmitter in Wheel Housing - G432-

- ❑ Removing and Installing. Refer to ➤ ["5.6.1 Left and Right Front Tire Pressure Monitoring Transmitter in Wheel Housing G431/G432, Removing and Installing, Touareg MY 2010 and Touareg MY 2015", page 69](#) .
- ❑ Component location: behind the wheel housing liner in the insulation between the fender and the longitudinal member

### 3 - Right Rear Tire Pressure Monitoring Transmitter in Wheel Housing - G434-

- ❑ Removing and Installing. Refer to ➤ ["5.6.2 Left and Right Rear Tire Pressure Monitoring Transmitter in Wheel Housing G433/G434, Removing and Installing, Touareg 2010, Touareg 2015", page 70](#) .
- ❑ Component location: behind the wheel housing liner in the direction of travel

### 4 - Right Rear Tire Pressure Monitoring Sensor - G225-

- ❑ Removing and Installing. Refer to ➤ ["5.4.2 Tire Pressure Monitoring Sensor, Removing and Installing, without Valve, Version 1, Service Version", page 56](#) .

### 5 - Left Rear Tire Pressure Monitoring Sensor - G224-

- ❑ Removing and Installing. Refer to ➤ ["5.4.2 Tire Pressure Monitoring Sensor, Removing and Installing, without Valve, Version 1, Service Version", page 56](#) .

### 6 - Left Rear Tire Pressure Monitoring Transmitter in Wheel Housing - G433-

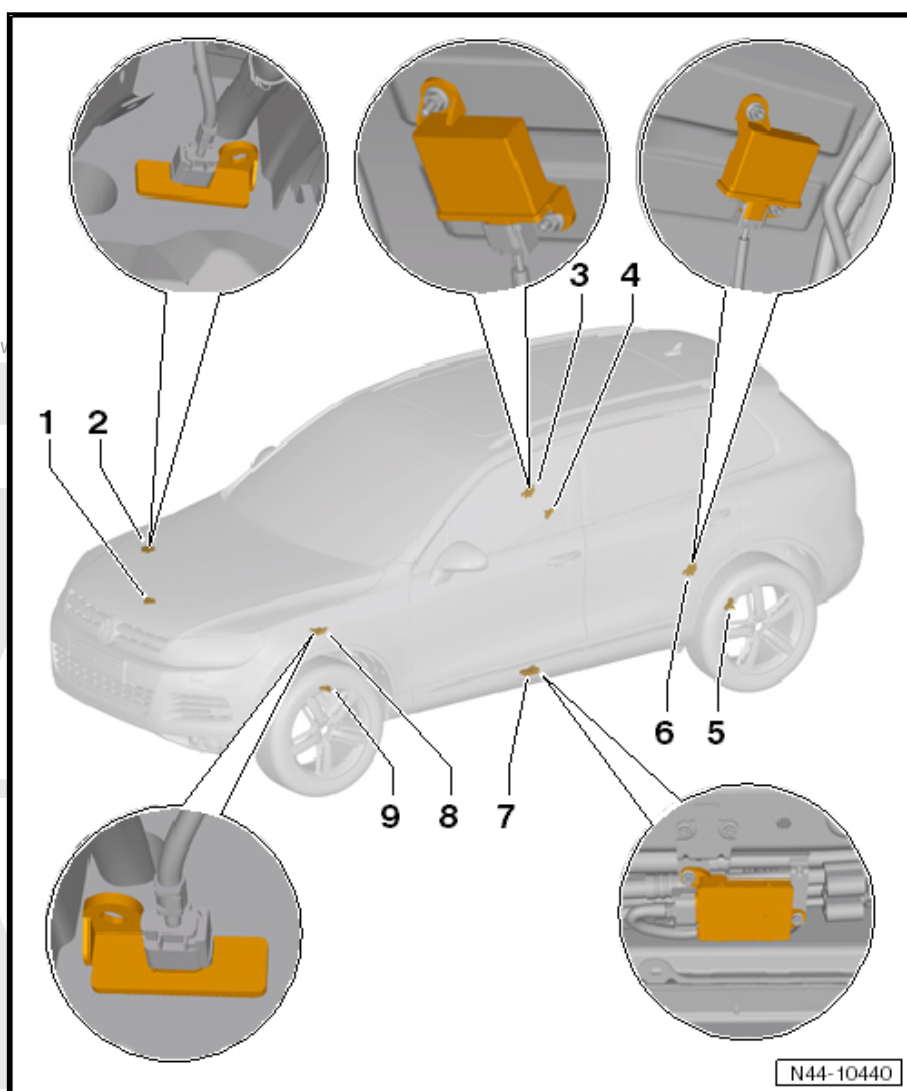
- ❑ Removing and Installing. Refer to ➤ ["5.6.2 Left and Right Rear Tire Pressure Monitoring Transmitter in Wheel Housing G433/G434, Removing and Installing, Touareg 2010, Touareg 2015", page 70](#) .
- ❑ Component location: behind the wheel housing liner in the direction of travel

### 7 - Tire Pressure Monitoring Control Module - J502-

- ❑ Removing and Installing. Refer to ➤ ["5.5 Tire Pressure Monitoring Control Module J502, Removing and Installing", page 61](#) .
- ❑ Component location: bolted to the left sill under the B-pillar

### 8 - Left Front Tire Pressure Monitoring Transmitter in Wheel Housing - G431-

- ❑ Removing and Installing. Refer to ➤ ["5.6.1 Left and Right Front Tire Pressure Monitoring Transmitter in Wheel Housing G431/G432, Removing and Installing, Touareg MY 2010 and Touareg MY 2015", page 69](#) .







- ❑ Component location: behind the wheel housing liner in the insulation between the fender and the longitudinal member

#### 9 - Left Front Tire Pressure Monitoring Sensor - G222-

- ❑ Removing and Installing. Refer to ➤ ["5.4.2 Tire Pressure Monitoring Sensor, Removing and Installing, without Valve, Version 1, Service Version", page 56](#) .

### 5.2.3 Component Location Overview - Tire Pressure Monitoring System, Auto Location



#### Note

*The target pressures are stored in the Tire Pressure Monitoring Control Module - J502- and only need to be changed if the wheel dimensions have changed, for example if different summer or winter tires are installed. The system automatically learns new or different wheel electronics.*

#### 1 - Left Front Tire Pressure Monitoring Sensor - G222-

- ❑ Removing and Installing. Refer to ➤ ["5.4 Tire Pressure Monitoring Sensors G222 / G223 / G224 / G225, Removing and Installing", page 55](#) .

#### 2 - Right Front Tire Pressure Monitoring Sensor - G223-

- ❑ Removing and Installing. Refer to ➤ ["5.4 Tire Pressure Monitoring Sensors G222 / G223 / G224 / G225, Removing and Installing", page 55](#) .

#### 3 - Right Rear Tire Pressure Monitoring Sensor - G225-

- ❑ Removing and Installing. Refer to ➤ ["5.4 Tire Pressure Monitoring Sensors G222 / G223 / G224 / G225, Removing and Installing", page 55](#) .

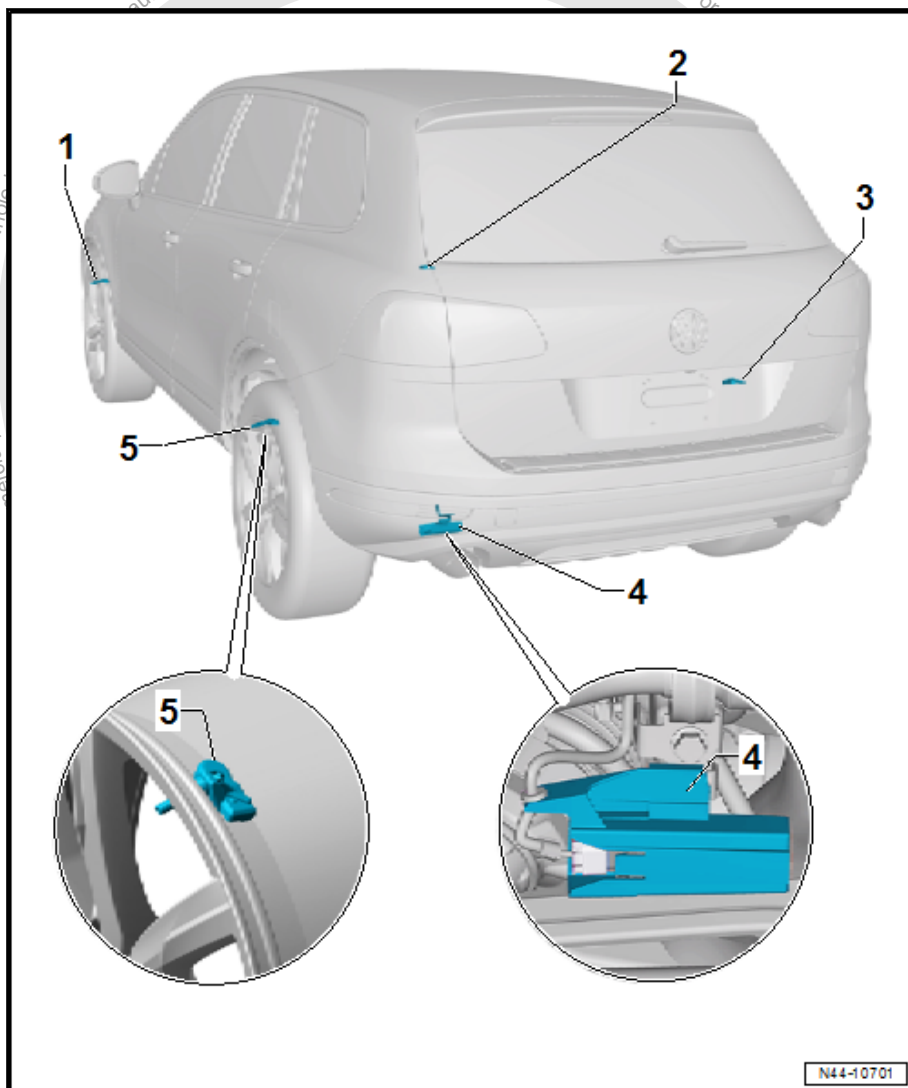
#### 4 - Tire Pressure Monitoring Control Module - J502-

- ❑ Removing and Installing. Refer to ➤ ["5.5.9 Tire Pressure Monitoring Control Module, Removing and Installing, from MY 2015, Touareg MY 2015", page 67](#) .

- ❑ Component location: on the left stabilizer bar clamp of the rear axle

#### 5 - Left Rear Tire Pressure Monitoring Sensor - G224-

- ❑ Removing and Installing. Refer to ➤ ["5.4 Tire Pressure Monitoring Sensors G222 / G223 / G224 / G225, Removing and Installing", page 55](#) .







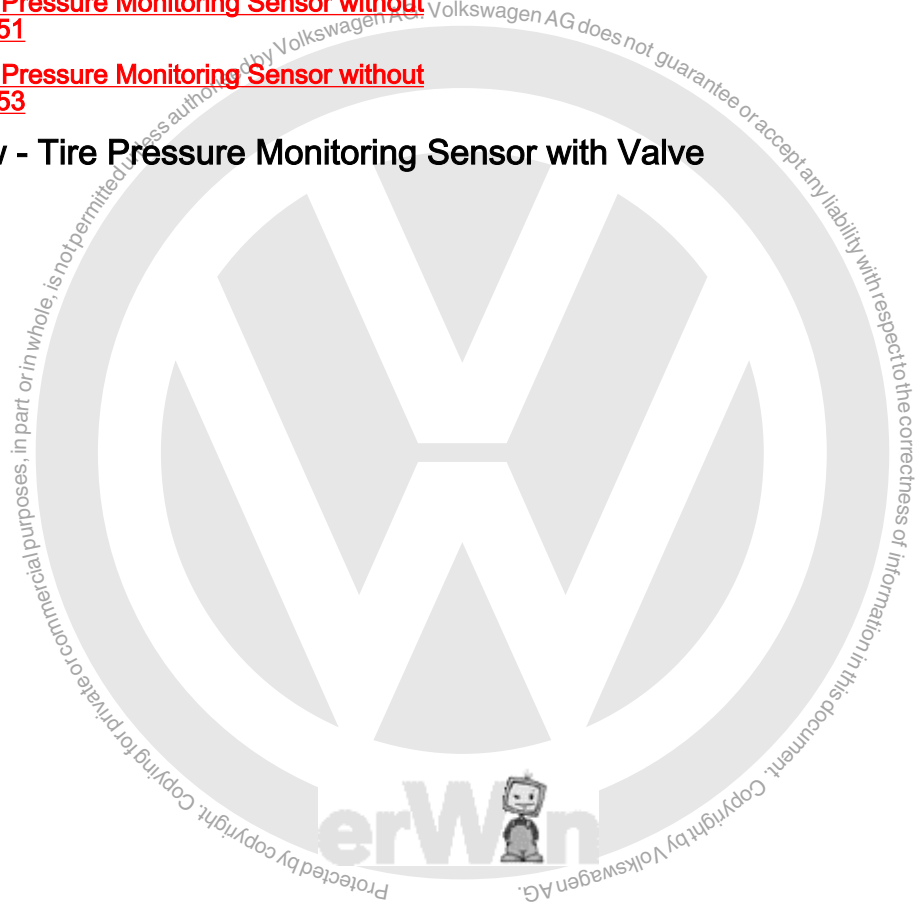
## 5.3 Overview - Tire Pressure Monitoring Sensor

⇒ ["5.3.1 Overview - Tire Pressure Monitoring Sensor with Valve", page 49](#)

⇒ ["5.3.2 Overview - Tire Pressure Monitoring Sensor without Valve, Version 1", page 51](#)

⇒ ["5.3.3 Overview - Tire Pressure Monitoring Sensor without Valve, Version 2", page 53](#)

### 5.3.1 Overview - Tire Pressure Monitoring Sensor with Valve



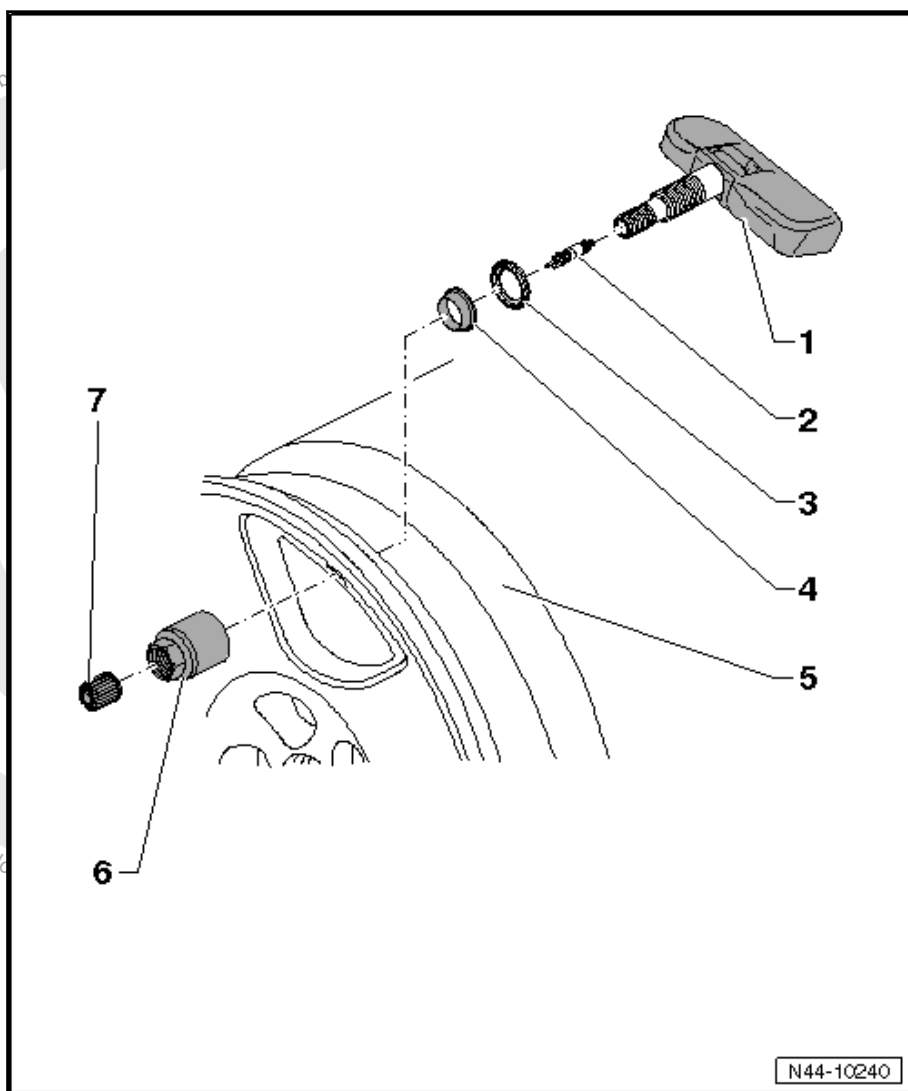


## 1 - Tire Pressure Monitoring Sensor

- ☐ Supplied complete as a service part
- ☐ Removing and Installing. Refer to ["5.4.1 Tire Pressure Monitoring Sensor with Valve, Removing and Installing", page 55](#).
- ☐ When battery is discharge, the entire Tire Pressure Monitoring Sensor must be replaced
- ☐ After using a wheel repair kit, the bore for the valve and opening of the pressure sensor must be wiped clean.

## 2 - Valve Insert

- ☐ Allocation. Refer to the ⇒ Electronic Parts Catalog (ETKA).
- ☐ Replace at every tire change



### Note

*Only use the original valve insert, as it has a special coating!*

## 3 - Sealing Washer

- ☐ Is slightly deformed when tightening the union nut ⇒ [Item 6 \(page 50\)](#)

## 4 - Seal

## 5 - Disc Wheel

- ☐ Mounting tires with emergency running characteristics. Refer to ⇒ ["4.5.2 Tires, Mounting, Run-Flat Tires and Ultra High Performance Tires", page 29](#).
- ☐ Mounting tires (wheels with tire pressure monitoring system). Refer to ⇒ ["4.5.1 Tires, Mounting, Wheels without and with Tire Pressure Monitoring System", page 26](#).

## 6 - Union Nut

- ☐ 4 Nm

## 7 - Valve Cap

- ☐ Use only original valve caps from the repair kit. Refer to the ⇒ Electronic Parts Catalog (ETKA)
- ☐ Do not use Comfort valve caps and metal caps



## 5.3.2 Overview - Tire Pressure Monitoring Sensor without Valve, Version 1





### 1 - Valve Cap

### 2 - Nut

- ☐ Individual component of  
⇒ [Item 7 \(page 52\)](#)
- ☐ 4 Nm
- ☐ Always replace if re-  
moved

### 3 - Washer

- ☐ Individual component of  
⇒ [Item 7 \(page 52\)](#)

### 4 - Disc Wheel

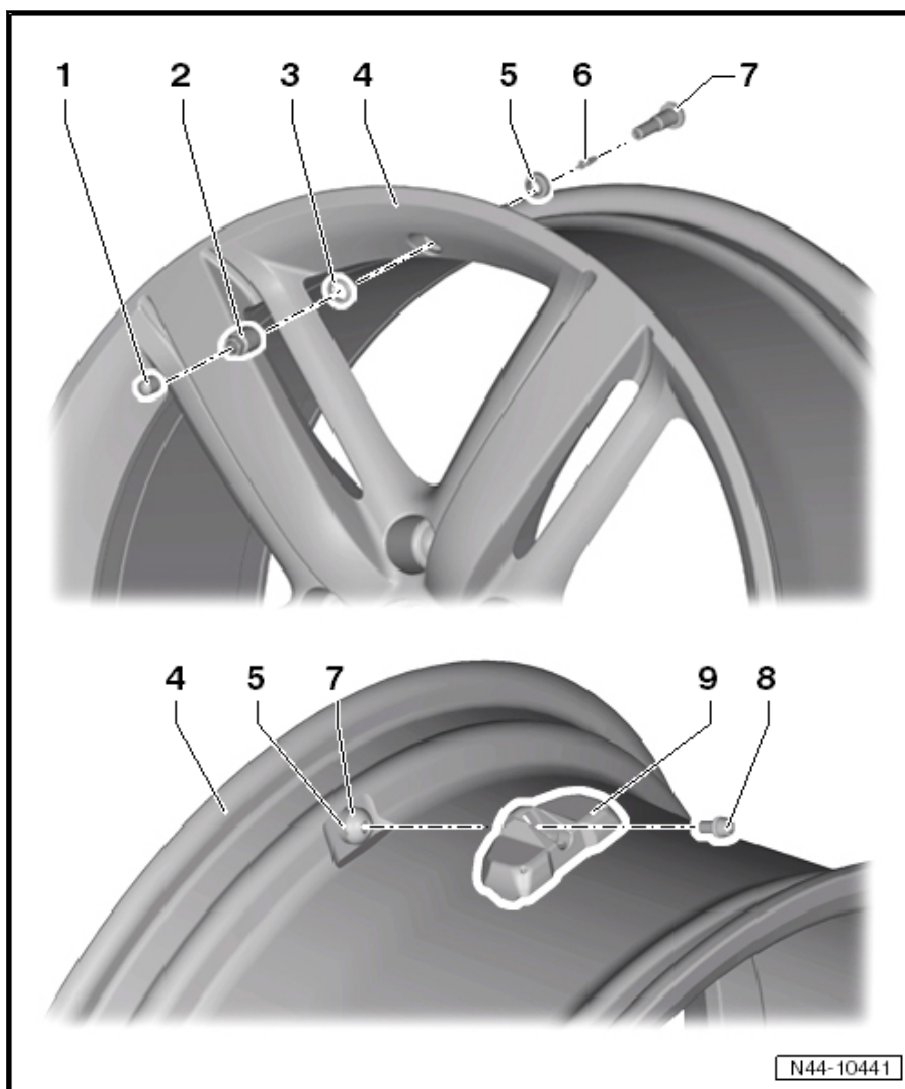
- ☐ Tire mounting. Refer to  
⇒ [“9.8.2 Valve, Remov-  
ing and Installing, Rub-  
ber Valve”, page 109](#) .

### 5 - Seal

- ☐ Individual component of  
⇒ [Item 7 \(page 52\)](#)

### 6 - Valve Insert

- ☐ Replace at every tire  
change



### Note

*Do not use brass valve inserts, but  
only use nickel-plated (silver) valve  
inserts (corrosion risk).*

### 7 - Metal Valve

- ☐ Supplied as a replacement part complete with bolt ⇒ [Item 8 \(page 52\)](#)
- ☐ Removing and Installing. Refer to ⇒ [“9.8.3 Valve, Removing and Installing, Metal Valve”, page 110](#) .

### 8 - Bolt

- ☐ Torx bolt (service version)
- ☐ Individual component of ⇒ [Item 7 \(page 52\)](#)
- ☐ 4 Nm
- ☐ Square screw with a flat head (vehicle before customer delivery)

### 9 - Tire Pressure Monitoring Sensor

- ☐ Left Front Tire Pressure Monitoring Sensor - G222-
- ☐ Right Front Tire Pressure Monitoring Sensor - G223-
- ☐ Left Rear Tire Pressure Monitoring Sensor - G224-
- ☐ Right Rear Tire Pressure Monitoring Sensor - G225-



- ❑ Removing and installing on vehicles after customer delivery. Refer to ⇒ [“5.4.2 Tire Pressure Monitoring Sensor, Removing and Installing, without Valve, Version 1, Service Version”, page 56](#) .
- ❑ Removing and installing on vehicles before customer delivery. Refer to ⇒ [“5.4.3 Tire Pressure Monitoring Sensor, Removing and Installing, without Valve, Version 1, Production Version”, page 57](#) .



#### Note

*The tire pressure monitoring sensors expire after approximately 10 years.*

### 5.3.3 Overview - Tire Pressure Monitoring Sensor without Valve, Version 2





### 1 - Tire Pressure Monitoring Sensor

- ☐ Left Front Tire Pressure Monitoring Sensor - G222-
- ☐ Right Front Tire Pressure Monitoring Sensor - G223-
- ☐ Left Rear Tire Pressure Monitoring Sensor - G224-
- ☐ Right Rear Tire Pressure Monitoring Sensor - G225-
- ☐ Removing and Installing. Refer to ➤ ["5.4.4 Tire Pressure Monitoring Sensors G222 / G223 / G224 / G225 , Removing and Installing, Version 2", page 59](#) .

### 2 - Bolt

- ☐ Flat head square head screw
- ☐ Is supplied as a complete replacement part with the tire pressure monitoring sensor. Refer to the ➤ Electronic Parts Catalog (ETKA)

### 3 - Metal Valve

- ☐ Is supplied as a complete replacement part with the tire pressure monitoring sensor. Refer to the ➤ Electronic Parts Catalog (ETKA)

### 4 - Valve Insert

- ☐ Replace at every tire change

### 5 - Rim

### 6 - Union Nut

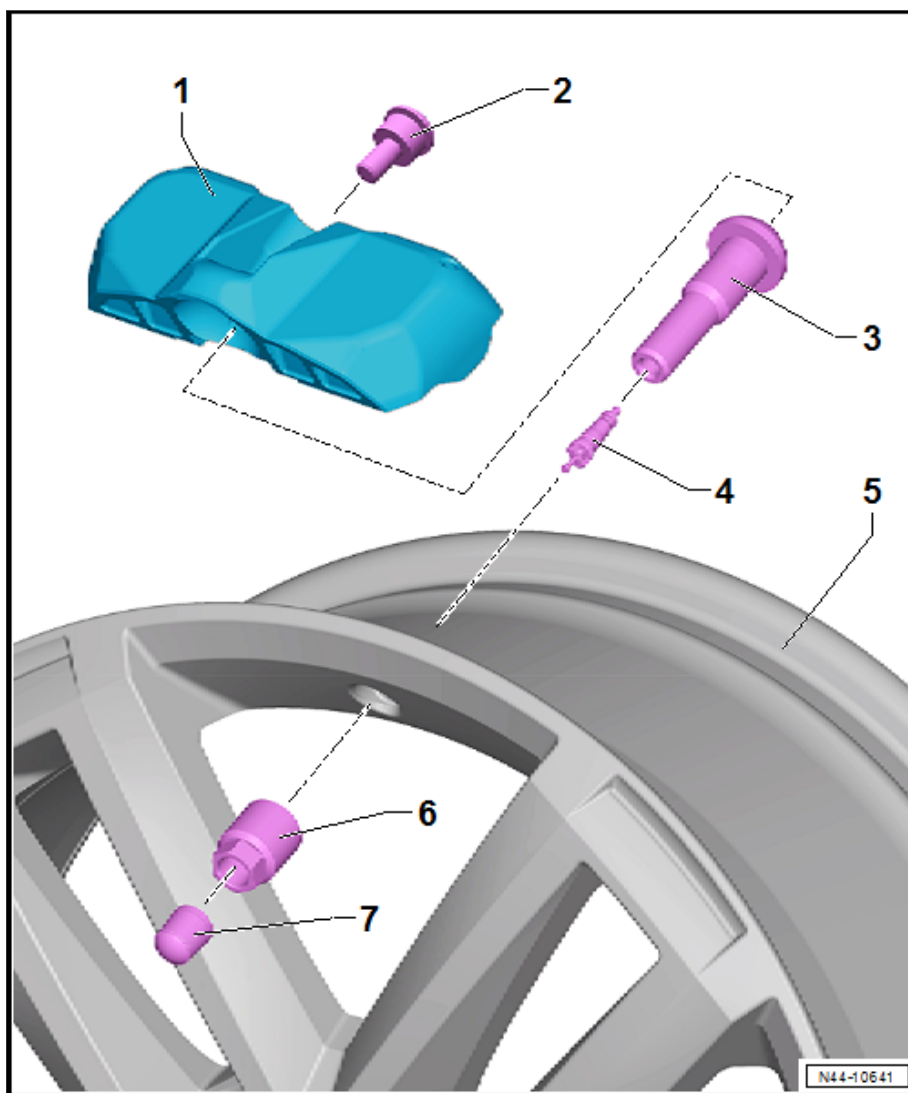
- ☐ 4 Nm

◆ Do not counterhold on the metal valve when tightening

◆ A washer in the union nut causes the metal valve to be bolted down first to the Tire Pressure Monitoring Sensor when tightening. After the washer breaks, the Tire Pressure Monitoring Sensor will be bolted to the rim.

- ☐ Always replace if removed

### 7 - Valve Cap







## 5.4 Tire Pressure Monitoring Sensors - G222- / -G223- / -G224- / -G225- , Re- moving and Installing

⇒ "5.4.1 Tire Pressure Monitoring Sensor with Valve, Removing and Installing", page 55

⇒ "5.4.2 Tire Pressure Monitoring Sensor, Removing and Installing, without Valve, Version 1, Service Version", page 56

⇒ "5.4.3 Tire Pressure Monitoring Sensor, Removing and Installing, without Valve, Version 1, Production Version", page 57

⇒ "5.4.4 Tire Pressure Monitoring Sensors G222 / G223 / G224 / G225 , Removing and Installing, Version 2", page 59

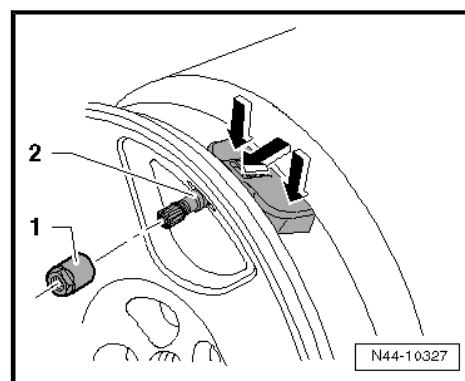
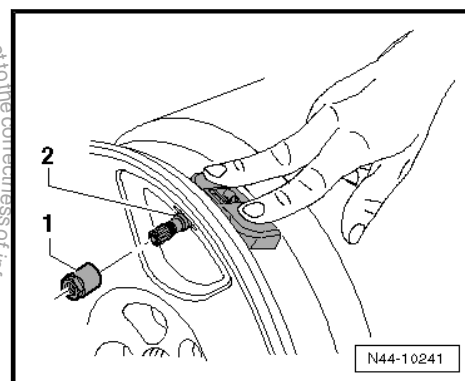
### 5.4.1 Tire Pressure Monitoring Sensor with Valve, Removing and Installing

#### Removing

- Remove the union nut -1-.
- Remove the Tire Pressure Monitoring Sensor -2- from the rim well.

#### Installing

- Clean the valve hole.
- Install the Tire Pressure Monitoring Sensor -2- with the new seal and sealing washer.
- Press the Tire Pressure Monitoring Sensor -2- on the spots marked with the -arrows- into the disc wheel (rim).
- Install the union nut -1- on the tire pressure monitoring sensor from the outside.



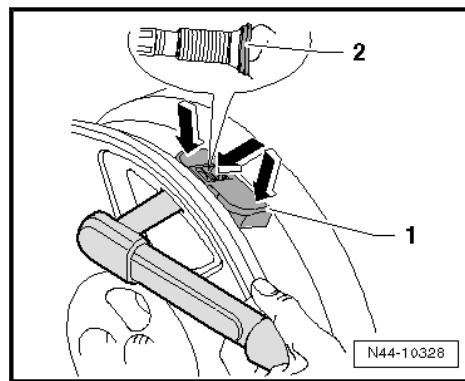


- Install the Tire Pressure Monitoring Sensor -1- at the marked positions -arrows- in the rim well and tighten the union nut to the tightening specification.



#### Note

- ♦ Only tighten the union nut to the specified tightening specification.
- ♦ Sealing washer -2- becomes slightly deformed when doing this.
- ♦ The sealing washer can be installed one time only. At every installation, replace the sealing washer and rubber seal with new parts.
- ♦ Do not tighten the union nut again. This will damage the seal and it will leak.



#### Tightening Specifications

- ♦ Refer to ⇒ [“5.3.1 Overview - Tire Pressure Monitoring Sensor with Valve”, page 49](#)

### 5.4.2 Tire Pressure Monitoring Sensor, Removing and Installing, without Valve, Version 1, Service Version

#### Removing

- Remove the tire from the disc wheel. Refer to ⇒ [“4.5 Tires, Mounting”, page 26](#).

See which version is installed before starting any work.

#### I - Service version

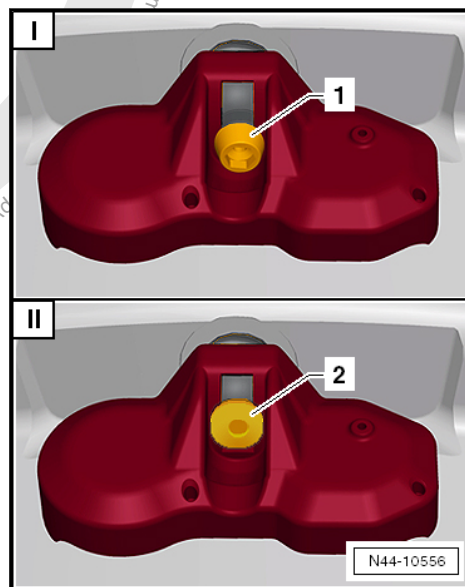
The tire pressure monitoring sensor is attached to the valve with an inner TORX screw -1- on the service version.

If the service version is installed, the following repair procedure must be used. Refer to ⇒ [page 57](#).

#### II - Vehicles before customer delivery

The tire pressure monitoring sensor is attached to the valve with a square screw with a flat head -2- on vehicles before customer delivery.

If the production version is installed, the following repair procedure must be used. Refer to ⇒ [page 58](#).

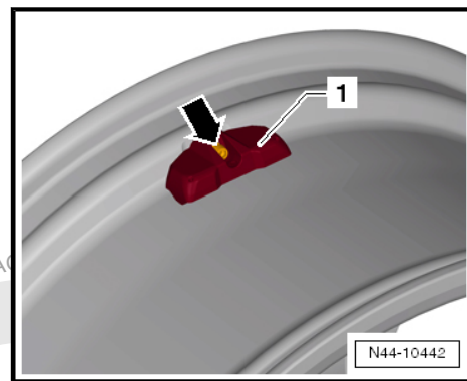




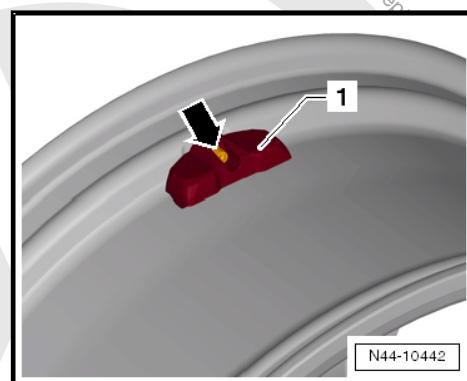
- Remove the screw -arrow- from the tire pressure monitoring sensor -1-.
- Counterhold metal valve using retainer (for example 2 mm spiral bore) while doing so.

#### Installing

- Clean the valve hole.



- Press the tire pressure monitoring sensor -1- onto the disc wheel (rim) and tighten -arrow-.
- Counterhold metal valve using retainer (for example 2 mm spiral bore) while doing so.



#### Note

- ◆ *Visually check the valve after installing it and make sure it is tight. The tire pressure monitoring sensor -1- must not have any play when it is installed and it must touch the supports in the rim bed.*
- ◆ *Do not tighten the valve again to the tightening specification after it has been installed.*

#### Tightening Specifications

- ◆ Refer to ➤ [“5.3.2 Overview - Tire Pressure Monitoring Sensor without Valve, Version 1”, page 51](#)

### 5.4.3 Tire Pressure Monitoring Sensor, Removing and Installing, without Valve, Version 1, Production Version

Perform the following procedures:

#### Removing

- Remove the tire from the disc wheel.



See which version is installed before starting any work.

### I - Service version

The tire pressure monitoring sensor is attached to the valve with an inner TORX screw -1- on the service version.

If the service version is installed, the following repair procedure must be used. Refer to ➤ [page 57](#) .

### II - Vehicles before customer delivery

The tire pressure monitoring sensor is attached to the valve with a square screw with a flat head -2- on vehicles before customer delivery.

If the production version is installed, the following repair procedure must be used. Refer to ➤ [page 58](#) .

- Turn the nut -1- counter-clockwise until it is possible to remove the tire pressure monitoring sensor -2-.



#### Note

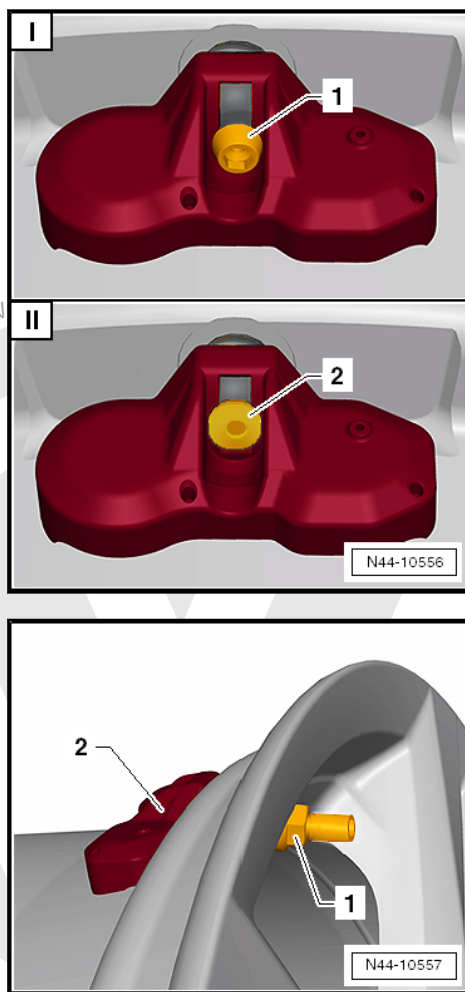
- ◆ The whole valve turns when the nut is turned -1-.
- ◆ The tire pressure monitoring sensor must always be replaced together with the metal valve. Refer to the ➤ [Electronic Parts Catalog \(ETKA\)](#) .
- Remove the metal valve. Refer to ➤ [“9.8.3 Valve, Removing and Installing, Metal Valve”, page 110](#) .

### Installing



#### Note

- ◆ The tire pressure monitoring sensor must always be replaced together with the metal valve. Refer to the ➤ [Electronic Parts Catalog \(ETKA\)](#) .
- ◆ The new metal valve is available with a new screw as a repair kit.
- Clean the valve hole.
- Install the metal valve. Refer to ➤ [“9.8.3 Valve, Removing and Installing, Metal Valve”, page 110](#) .



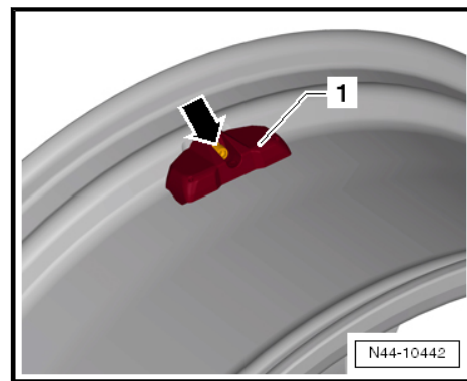


- Press the tire pressure monitoring sensor -1- onto the disk wheel (rim) and tighten the new screw -arrow-.
- Counterhold metal valve using retainer (for example 2 mm spiral bore) while doing so.



#### Note

- ◆ *Visually check the valve after installing it and make sure it is tight. The tire pressure monitoring sensor -1- must not have any play when it is installed and it must touch the supports in the rim bed.*
- ◆ *Do not tighten the valve again to the tightening specification after it has been installed.*



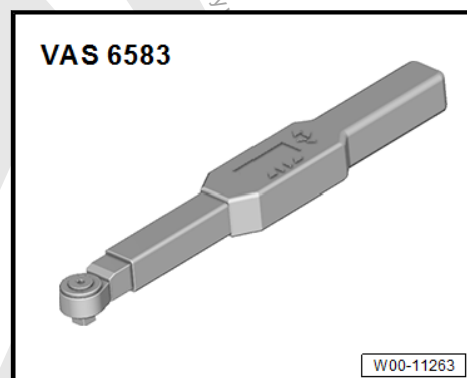
#### Tightening Specifications

- ◆ Refer to ➔ [“5.3.2 Overview - Tire Pressure Monitoring Sensor without Valve, Version 1”, page 51](#)

#### 5.4.4 Tire Pressure Monitoring Sensors - G222- / -G223- / -G224- / -G225- , Removing and Installing, Version 2

##### Special tools and workshop equipment required

- ◆ Electronic Torque Wrench 3-60Nm - VAS 6583-



#### Removing



#### Note

*During a routine tire change, it is not necessary to replace the Tire Pressure Monitoring Sensor with the metal valve.*

- Dismount the tire from the rim. Refer to ➔ [“4.3 Tires, Dismounting”, page 22](#) .



- Turn the nut -1- counter-clockwise until it is possible to remove the tire pressure monitoring sensor -2-.

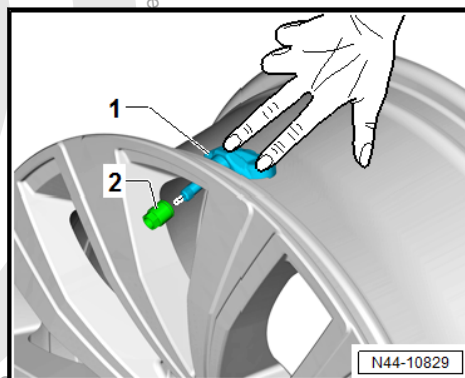
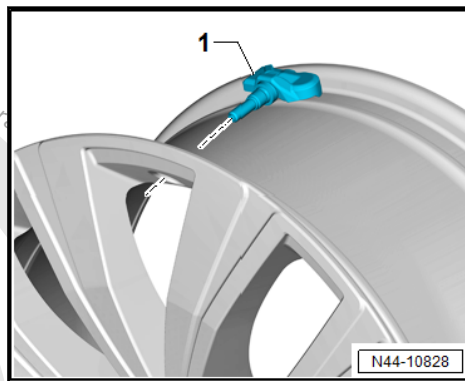
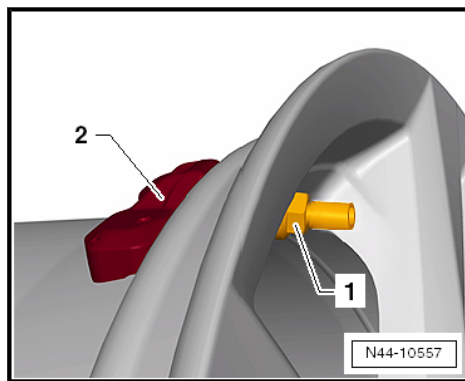


#### Note

*The whole valve turns when the nut is turned -1-.*

#### Installing

- Always replace the entire metal valve.
- The hex collar nut may only be used once.
- Only nickel-plated (silver) valve inserts are permitted to prevent corrosion.
- Only use tight-sealing plastic caps as valve caps.
- Completely replace the damaged valves.
- Damaged Tire Pressure Monitoring Sensors or valves must always be replaced.
- Do not clean the Tire Pressure Monitoring Sensor with steam jet cleaners or strong compressed air.
- Clean the Tire Pressure Monitoring Sensor after using tire sealant. The housing hole for the pressure sensor must not be blocked and must not be directly cleaned with compressed air.
- The original end torque is reduced when installed. Re-tightening the collar nut is not permitted.
- Clean the valve hole.
- Insert the Tire Pressure Monitoring Sensor -1- with the valve through the valve hole from the inside.
- Install the hex collar nut approximately three turns onto the Tire Pressure Monitoring Sensor from the outside.
- Using light pressure, push the Tire Pressure Monitoring Sensor -1- into the rim well, so that both sensor feet rest against the well.







- Tighten the hex collar nut on the Tire Pressure Monitoring Sensor -1- to the tightening specification.



#### Note

- ◆ Do not counterhold on the metal valve when tightening
- ◆ When installing, a bar breaks inside the hex collar nut, which causes the tightening specification to decrease slightly.
- ◆ Continue to tighten the hex collar nut to the tightening specification after feeling the bar break.

A - Extension (commercially available)

B - Electronic Torque Wrench 3-60Nm - VAS 6583-

- Visually inspect and make sure there is a secure fit. The Tire Pressure Monitoring Sensor must not have any play when installed and the supports must rest in the well.



#### NOTICE

**Damage to sensor due to incorrect assembly.**

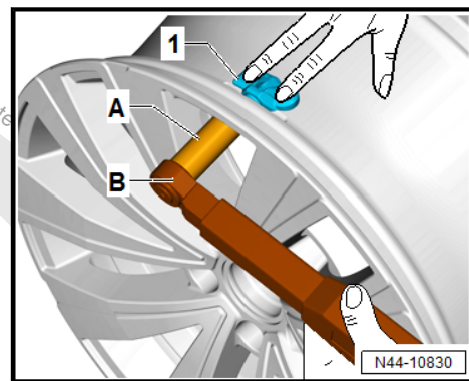
- After the sensor has been tightened to the tightening specification, it must not be tightened further.
- Install the valve cap on the valve.
- Install the tire on the rim. Refer to ⇒ [“4.5 Tires, Mounting”, page 26](#).

#### Tightening Specifications

- ◆ Refer to ⇒ [“5.3.1 Overview - Tire Pressure Monitoring Sensor with Valve”, page 49](#)

## 5.5 Tire Pressure Monitoring Control Module - J502- , Removing and Installing

⇒ [“5.5.1 Tire Pressure Monitoring Control Module J502 , Removing and Installing, Arteon MY 2018, Arteon MY 2021, Arteon Shooting Brake MY 2021, Passat MY 2015, Passat Wagon](#)





**MY 2015, Passat MY 2019 and Passat Wagon MY 2019", page 62**

**⇒ "5.5.2 Tire Pressure Monitoring Control Module, Removing and Installing, Passat MY 2011 and Passat Wagon MY 2011", page 64**

**⇒ "5.5.3 Tire Pressure Monitoring Control Module, Removing and Installing, CC MY 2010, CC MY 2012 and Passat CC MY 2009", page 64**

**⇒ "5.5.4 Tire Pressure Monitoring Control Module, Removing and Installing, Phaeton MY 2003", page 64**

**⇒ "5.5.5 Tire Pressure Monitoring Control Module J502 , Removing and Installing, Touran MY 2016", page 64**

**⇒ "5.5.6 Tire Pressure Monitoring Control Module J502 , Removing and Installing, Tiguan MY 2008", page 65**

**⇒ "5.5.7 Tire Pressure Monitoring Control Module J502 , Removing and Installing, Tiguan MY 2016, Tiguan MY 2017 (BW2) and Tiguan MY 2021", page 65**

**⇒ "5.5.8 Tire Pressure Monitoring Control Module, Removing and Installing, through MY 2014, Touareg MY 2010", page 66**

**⇒ "5.5.9 Tire Pressure Monitoring Control Module, Removing and Installing, from MY 2015, Touareg MY 2015", page 67**

**⇒ "5.5.10 Tire Pressure Monitoring Control Module, Removing and Installing, Touareg MY 2018, Touareg MY 2024", page 68**

**⇒ "5.5.11 Tire Pressure Monitoring Control Module Bracket, Removing and Installing, Touareg MY 2015", page 68**

## **5.5.1 Tire Pressure Monitoring Control Module - J502- , Removing and Installing, Arteon MY 2018, Arteon MY 2021, Arteon Shooting Brake MY 2021, Passat MY 2015, Passat Wagon MY 2015, Passat MY 2019 and Passat Wagon MY 2019**

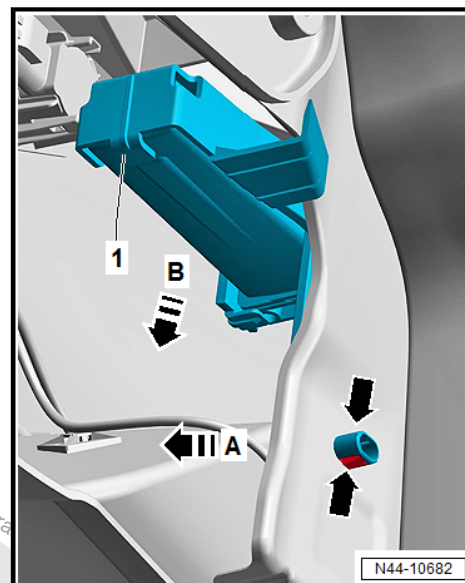
### **Component Location:**

The Tire Pressure Monitoring Control Module - J502- is installed on the right rear cross panel.

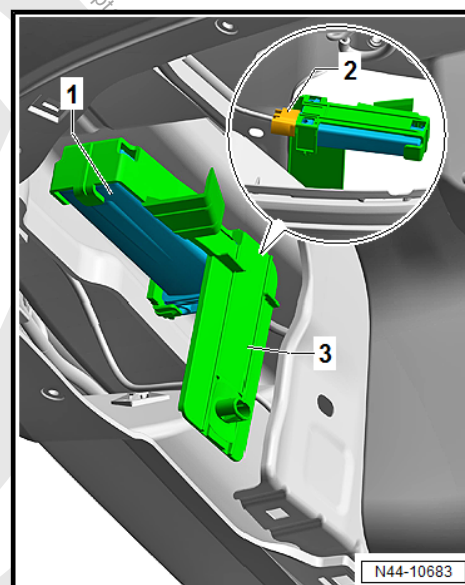
### **Removing**

- Switch off the ignition.
- Remove the right rear underbody trim panel. Refer to
  - ⇒ Body Exterior; Rep. Gr. 66 ; Underbody Trim Panel;
  - Component Location Overview - Underbody Trim Panels .

- Press the tabs -arrows- together and pivot the bracket -1- in the -direction of the arrow A-.
- Remove the bracket -1- in the -direction of the arrow B- and hold onto it.



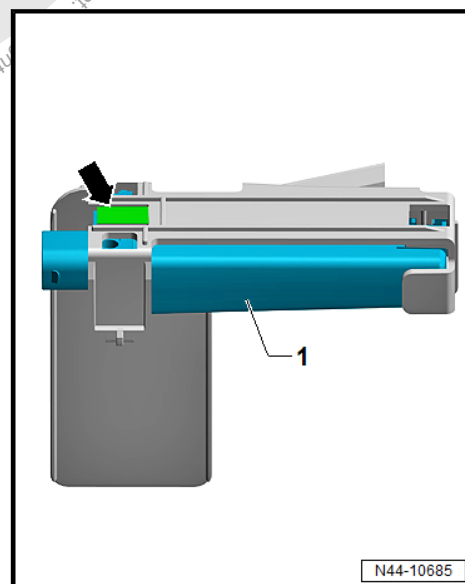
- Disconnect the connector -2- from the Tire Pressure Monitoring Control Module - J502- -1-.
- Remove the bracket -3- with the Tire Pressure Monitoring Control Module - J502- -1-.



- Lightly push the tab -arrow- upward and remove the Tire Pressure Monitoring Control Module - J502- -1- from the bracket.

### Installing

Install in reverse order of removal.





## 5.5.2 Tire Pressure Monitoring Control Module, Removing and Installing, Passat MY 2011 and Passat Wagon MY 2011

Refer to ⇒ Suspension, Wheels, Steering; Rep. Gr. 44 ; Tire Pressure Monitoring System; Tire Pressure Monitoring Control Module, Removing and Installing .

## 5.5.3 Tire Pressure Monitoring Control Module, Removing and Installing, CC MY 2010, CC MY 2012 and Passat CC MY 2009

Refer to ⇒ Suspension, Wheels, Steering; Rep. Gr. 44 ; Tire Pressure Monitoring System; Tire Pressure Monitoring Control Module, Removing and Installing .

## 5.5.4 Tire Pressure Monitoring Control Module, Removing and Installing, Phaeton MY 2003

Refer to ⇒ Suspension, Wheels, Steering; Rep. Gr. 44 ; Tire Pressure Monitoring System, Servicing, Generation 2 .

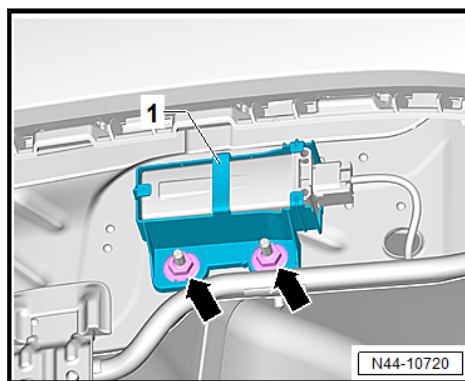
## 5.5.5 Tire Pressure Monitoring Control Module - J502- ,Removing and Installing, Touran MY 2016

### Component Location:

The Tire Pressure Monitoring Control Module - J502- is installed on the right rear cross panel.

### Removing

- Switch off the ignition.
- Remove the right rear underbody trim panel, if equipped. Refer to ⇒ Body Exterior; Rep. Gr. 66 ; Underbody Trim Panel; Overview - Underbody Trim Panels .
- Remove the nuts -arrows- and remove the bracket -1- downward.

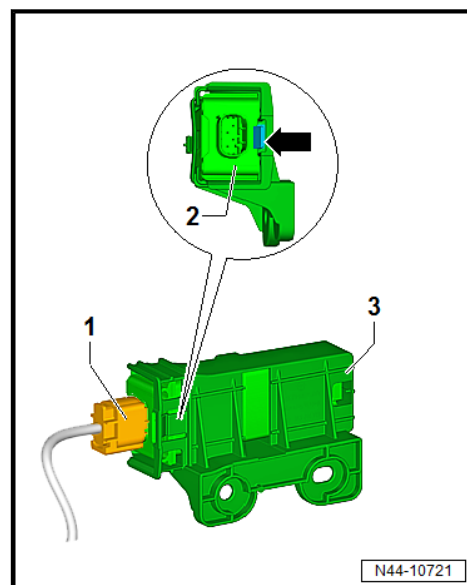




- Disconnect the connector -1- from the Tire Pressure Monitoring Control Module - J502- -2-.
- Lightly press the tab -arrow- outward and remove the Tire Pressure Monitoring Control Module - J502- -2- from the bracket -3-.

#### Installing

Install in reverse order of removal.



### 5.5.6 Tire Pressure Monitoring Control Module - J502- , Removing and Installing, Tiguan MY 2008

#### Component Location:

The Tire Pressure Monitoring Control Module - J502- is installed on the right rear longitudinal member behind the wheel housing liner.

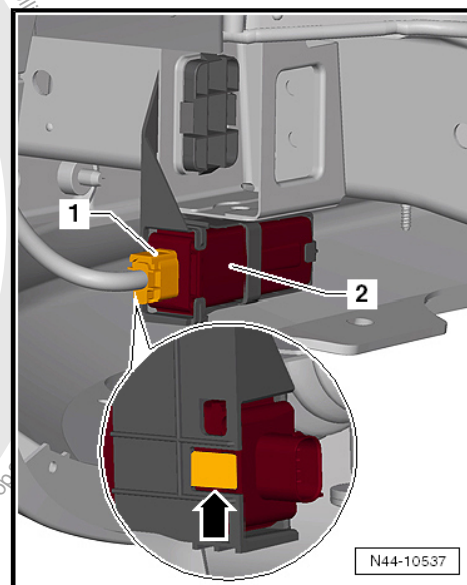
#### Perform the following procedures:

##### Removing

- Switch off the ignition.
- Loosen the right rear wheel housing liner in the back and fold it forward. Refer to ➔ Body Exterior; Rep. Gr. 66 ; Wheel Housing Liner .
- Disconnect the connector -1-.
- Lightly press the tab -arrow- to the side and remove the Tire Pressure Monitoring Control Module - J502- -2- from the bracket.

##### Installing

Install in reverse order of removal.



### 5.5.7 Tire Pressure Monitoring Control Module - J502- , Removing and Installing,



## Tiguan MY 2016, Tiguan MY 2017 (BW2) and Tiguan MY 2021

### Component Location:

The Tire Pressure Monitoring Control Module - J502- is installed on the right rear cross panel.

### Removing

- Switch off the ignition.

### Vehicles without trailer hitch

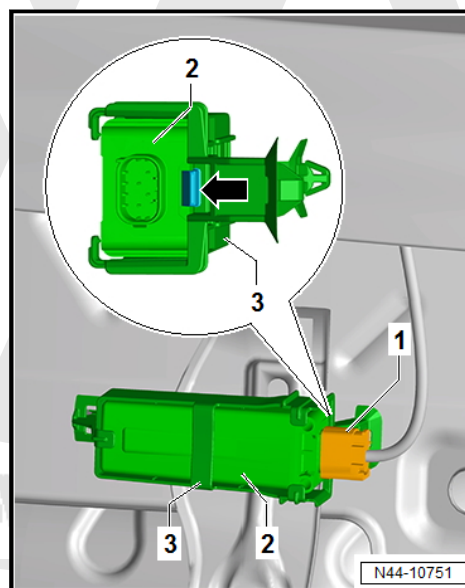
- Remove the bumper cover. Refer to ➤ Body Exterior; Rep. Gr. 63 ; Rear Bumper; Bumper Cover Removing and Installing .

### Continuation for all vehicles

- Disconnect the connector -1- from the Tire Pressure Monitoring Control Module - J502- -2-.
- Lightly press the tab -arrow- outward and remove the Tire Pressure Monitoring Control Module - J502- -2- from the bracket -3-.

### Installing

Install in reverse order of removal.



## 5.5.8 Tire Pressure Monitoring Control Module, Removing and Installing, through MY 2014, Touareg MY 2010

### Component Location:

The Tire Pressure Monitoring Control Module - J502- is bolted to the left sill under the B-pillar.

### Perform the following procedures:

### Removing

- Switch off the ignition.
- Remove the left floor trim. Refer to ➤ Body Exterior; Rep. Gr. 50 ; Underbody Panel .



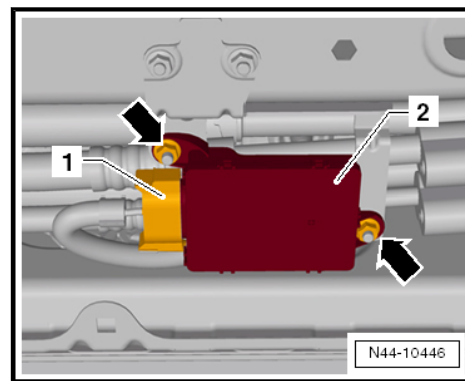


- Disconnect the connector -1-.
- Remove the bolts -arrow- and remove the Tire Pressure Monitoring Control Module - J502- -2-.

### Installing

Install in reverse order of removal. Note the following:

- Install the left floor trim. Refer to ➔ Body Exterior; Rep. Gr. 50 ; Underbody Panel .



### Tightening Specifications

Component	Tightening Specification
Tire Pressure Monitoring Control Module - J502- to body	6 Nm

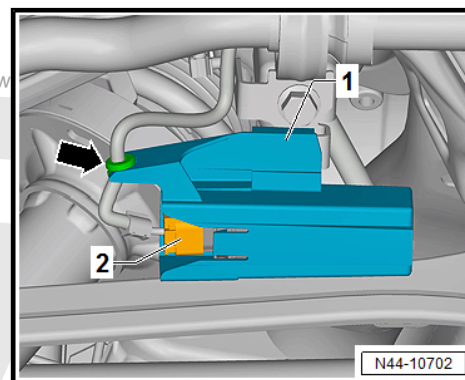
## 5.5.9 Tire Pressure Monitoring Control Module, Removing and Installing, from MY 2015, Touareg MY 2015

### Component Location:

The Tire Pressure Monitoring Control Module - J502- is installed on the left stabilizer bar clamp of the rear axle.

### Removing

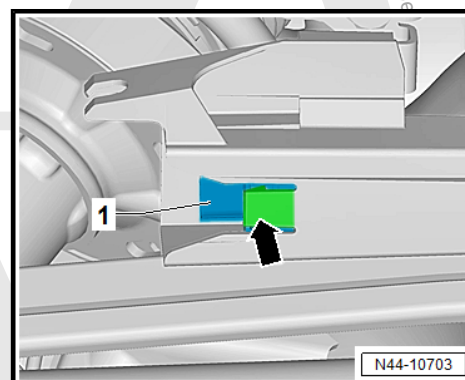
- Switch off the ignition.
- Remove the cable -arrow- from the bracket -1-.
- Disconnect the connector -2- from the Tire Pressure Monitoring Control Module - J502- .



- Lightly press the tab -arrow- downward and remove the Tire Pressure Monitoring Control Module - J502- -1- from the bracket.

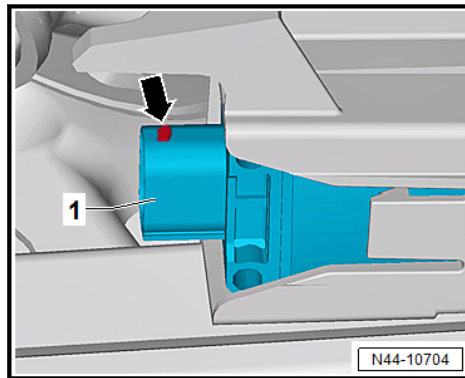
### Installing

Install in reverse order of removal. Note the following:





- Insert the Tire Pressure Monitoring Control Module - J502- into the bracket so that the tab -arrow- faces upward.



### 5.5.10 Tire Pressure Monitoring Control Module, Removing and Installing, Touareg MY 2018, Touareg MY 2024

#### Component location

The Tire Pressure Monitoring Control Module - J502- is installed on the rear subframe.

#### Removing

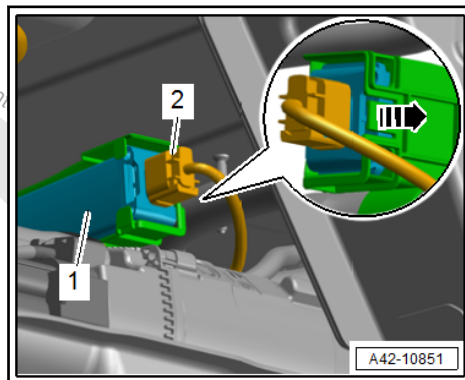
- Switch off the ignition.

#### Vehicles with underbody trim panels

- Remove the underbody trim panels. Refer to ➔ Body Exterior; Rep. Gr. 66; Underbody Trim Panel; Underbody Trim Panels, Removing and Installing .

#### Continuation for all vehicles

- Disconnect the connector -2-.
- Release the retainer in the -direction of the arrow-.
- Remove the Tire Pressure Monitoring Control Module - J502- -1- toward the rear.



#### Installing

Install in reverse order of removal.

### 5.5.11 Tire Pressure Monitoring Control Module Bracket, Removing and Installing, Touareg MY 2015

#### Removing

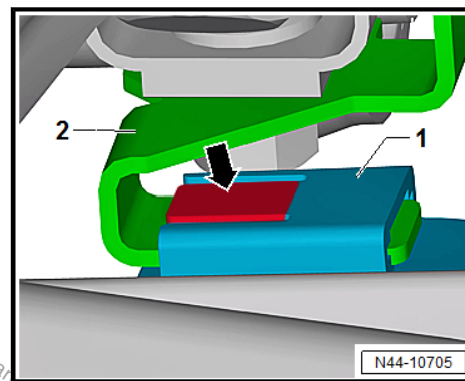
- Remove the Tire Pressure Monitoring Control Module - J502- . Refer to ➔ [“5.5.9 Tire Pressure Monitoring Control Module, Removing and Installing, from MY 2015; Touareg MY 2015”, page 67](#) .



- Press the tab -arrow- gently upward and remove the bracket -1- from the holder -2-.

#### Installing

Install in reverse order of removal.



## 5.6 Transmitter in Wheel Housing for Tire Pressure Monitoring System, Removing and Installing

⇒ [“5.6.1 Left and Right Front Tire Pressure Monitoring Transmitter in Wheel Housing G431/G432 , Removing and Installing, Touareg MY 2010 and Touareg MY 2015”, page 69](#)

⇒ [“5.6.2 Left and Right Rear Tire Pressure Monitoring Transmitter in Wheel Housing G433/G434 , Removing and Installing, Touareg 2010, Touareg 2015”, page 70](#)

⇒ [“5.6.3 Transmitter in Wheel Housing for Tire Pressure Monitoring System, Removing and Installing, Phaeton 2003”, page 70](#)

### 5.6.1 Left and Right Front Tire Pressure Monitoring Transmitter in Wheel Housing - G431/G432- , Removing and Installing, Touareg MY 2010 and Touareg MY 2015

#### Component Location:

The Left and Right Front Tire Pressure Monitoring Transmitter in Wheel Housing - G431/G432- is installed behind the wheel housing liner in the insulation between the fender and the longitudinal member.

Perform the following procedures:

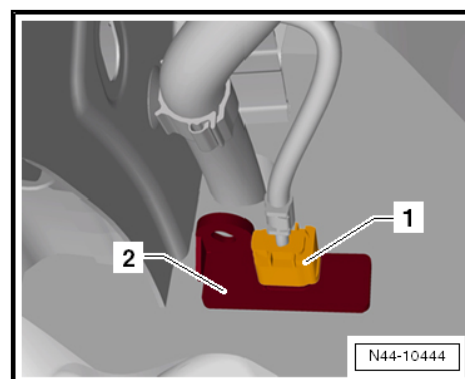
#### Removing

- Switch off the ignition.
- Remove the wheel housing liner. Refer to ⇒ Body Exterior; Rep. Gr. 66 ; Wheel Housing Liner .
- Disconnect the connector -1-.
- Remove the Left and Right Front Tire Pressure Monitoring Transmitter in Wheel Housing - G431/G432- -2- from the insulation.

#### Installing

Install in reverse order of removal. Note the following:

- Install the wheel housing liner. Refer to ⇒ Body Exterior; Rep. Gr. 66 ; Wheel Housing Liner .





## 5.6.2 Left and Right Rear Tire Pressure Monitoring Transmitter in Wheel Housing - G433/G434- , Removing and Installing, Touareg 2010, Touareg 2015

### Component Location:

The Left and Right Rear Tire Pressure Monitoring Transmitter in Wheel Housing - G433/G434- is installed behind the wheel housing liner in the direction of travel.

### Perform the following procedures:

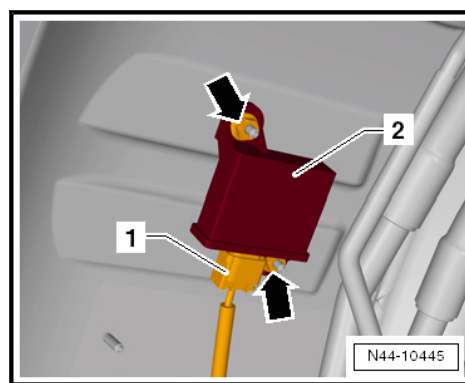
#### Removing

- Switch off the ignition.
- Remove the wheel housing liner. Refer to ➔ Body Exterior; Rep. Gr. 66 ; Wheel Housing Liner .
- Disconnect the connector -1-.
- Remove the bolts -arrow- and remove the Left and Right Rear Tire Pressure Monitoring Transmitter in Wheel Housing - G433/G434- -2-.

#### Installing

Install in reverse order of removal. Note the following:

- Install the wheel housing liner. Refer to ➔ Body Exterior; Rep. Gr. 66 ; Wheel Housing Liner .



### Tightening Specifications

Component	Tightening Specification
Left and Right Rear Tire Pressure Monitoring Transmitter in Wheel Housing - G433/G434- to the body	6 Nm

## 5.6.3 Transmitter in Wheel Housing for Tire Pressure Monitoring System, Removing and Installing, Phaeton 2003

Refer to ➔ Suspension, Wheels, Steering; Rep. Gr. 44 ; Tire Pressure Monitoring System, Servicing, Generation 2 .



## 6 Wheel Bolts

⇒ ["6.1 Wheel Bolt Versions", page 71](#)

⇒ ["6.2 Wheel Bolts, Anti-Theft Wheel Bolt", page 72](#)

⇒ ["6.3 Wheel Bolts, Master Sets for Anti-Theft Wheel Bolts", page 72](#)

### 6.1 Wheel Bolt Versions

#### Cup shape explanations

There are two cup shapes: rounded and conical.

The spherical cap has a curved surface -arrow A- on the section of a sphere. This design of the spherical cap was used for original rims.

The conical spherical cap has a flat surface -arrow B- on the section of a sphere. This design of the spherical cap is used partially on rims from the accessories program.

I - Wheel Bolt with Spherical Cap

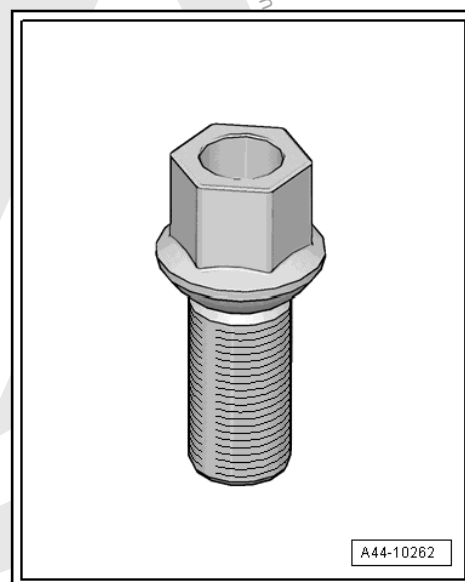
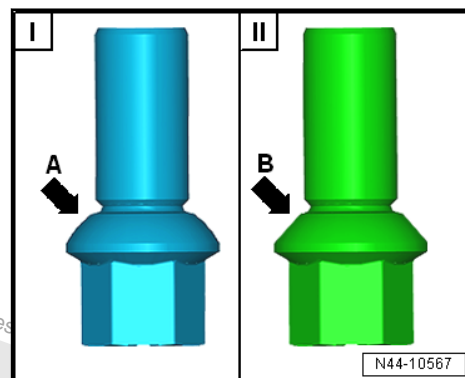
II - Wheel Bolt with Cone-Shaped Spherical Cap



#### Note

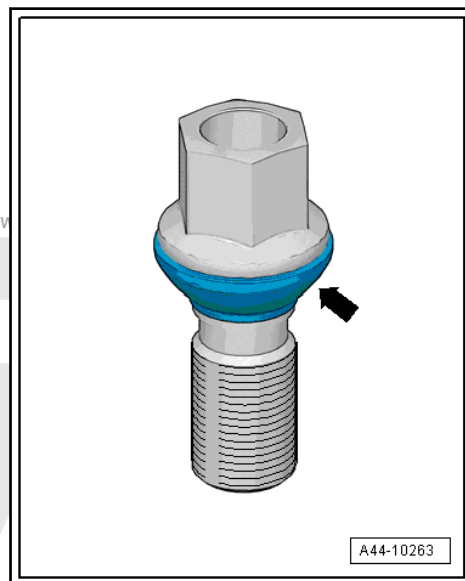
- ◆ *Make sure the correct wheel bolts are installed. Refer to the ⇒ [Electronic Parts Catalog \(ETKA\)](#) .*
- ◆ *Only the same wheel bolts may be installed on all four wheel rims for every vehicle.*

**Standard, one-piece wheel bolt.**

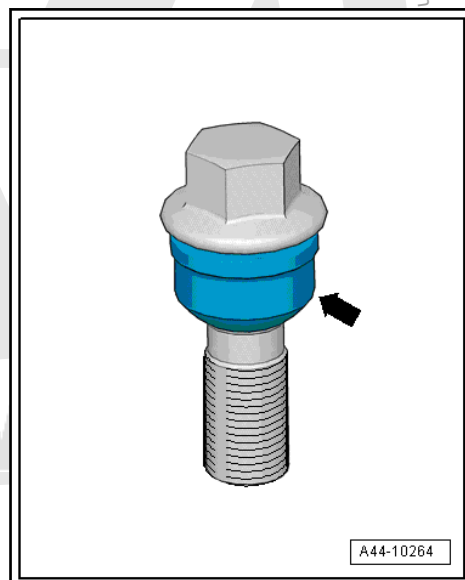




### Two-piece wheel bolts with short rotatable spherical cap.



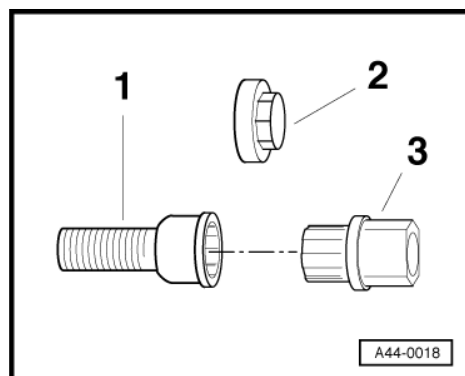
### Two-piece wheel bolts with long rotatable spherical cap.



## 6.2 Wheel Bolts, Anti-Theft Wheel Bolt

### Anti-Theft Wheel Bolt

- 1 - Anti-Theft Wheel Bolt
- 2 - Cap
- 3 - Wheel Bolt Adapter



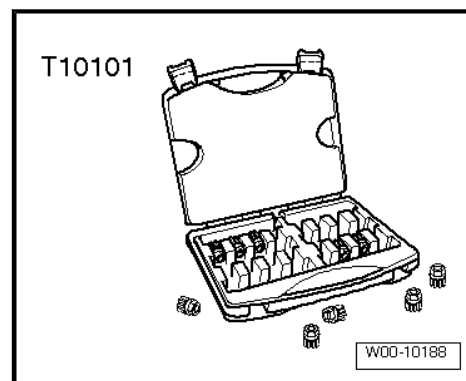
## 6.3 Wheel Bolts, Master Sets for Anti-Theft Wheel Bolts

Special tools and workshop equipment required





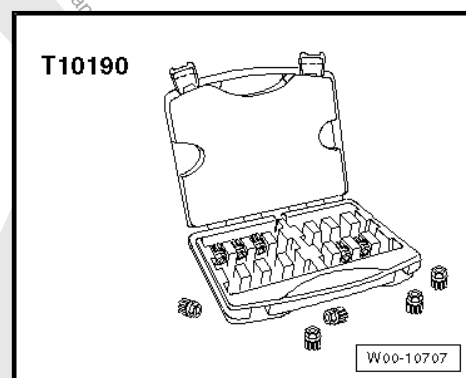
◆ Wheel Lock Set - T10101-



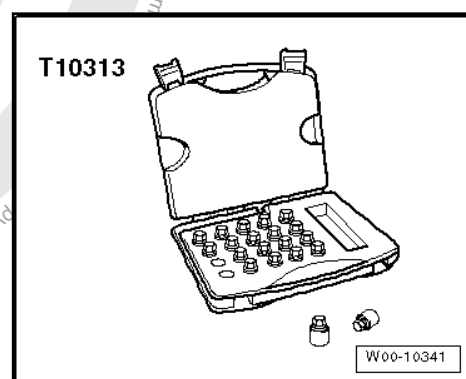
◆ Wheel Lock Set - T10101 A-



◆ Wheel Lock Set - T10190-

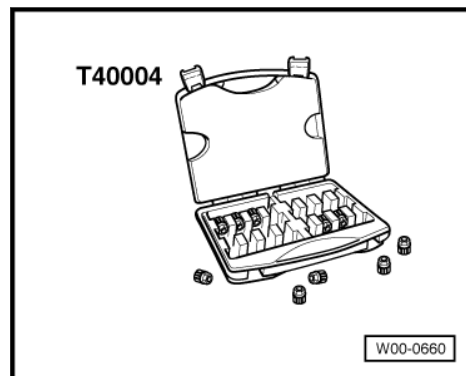


◆ Wheel Lock Set - T10313-





◆ Wheel Lock Set - T40004-



◆ Wheel Lock Set - T40073-





## 7 Tire Information

- ⇒ [“7.1 Side Wall Lettering”, page 75](#)
- ⇒ [“7.2 Tire Dimension”, page 77](#)
- ⇒ [“7.3 Load Index \(LI\)”, page 77](#)
- ⇒ [“7.4 Speed Rating”, page 78](#)
- ⇒ [“7.5 EU Tire Label”, page 79](#)
- ⇒ [“7.6 Overview - Radial Ply Tire”, page 83](#)
- ⇒ [“7.7 Run-Flat Tire, SST \(Self-Supporting Tire\)”, page 88](#)
- ⇒ [“7.8 Tires, Storing”, page 90](#)
- ⇒ [“7.9 Tires, Reinforced, Extra Load”, page 90](#)
- ⇒ [“7.10 Winter Tires”, page 91](#)
- ⇒ [“7.11 Winter Tires with Speed Symbol V”, page 93](#)
- ⇒ [“7.12 All-Season Tires”, page 94](#)
- ⇒ [“7.13 Rolling Resistance Tires”, page 94](#)
- ⇒ [“7.14 Tires, Aging”, page 95](#)
- ⇒ [“7.15 Tires with Rim Protector”, page 96](#)
- ⇒ [“7.16 Tire Sizes, AWD Vehicles”, page 97](#)
- ⇒ [“7.17 Increasing Temperature Due To Low Tire Pressure”, page 97](#)

### 7.1 Side Wall Lettering



#### Note

*Only Volkswagen Original + tires have been introduced for the launch of the ID.3 and all following electric vehicles as well as successively for all gasoline vehicles. They have been specially destined with our previous tire manufacturer for our Volkswagen models and go through over 50 test requirements. Result: tires which match the specific properties of the vehicle model and in this way put all the power to the road. Volkswagen original + tires can be identified by the plus as a new OE marking on the side surface on the tires.*

Example: Continental ContiPremiumContact 2



## 1 - Size Designation

- ☐ For example B. 205/55 R 16. Refer to ➤ [page 77](#).

## 2 - Position of Tread Wear Indicators (TWI)

## 3 - Manufacturer (trade name)

- ☐ For example continental

## 4 - Construction

- ☐ Radial - radially-oriented fibers in shell
- ☐ Tubeless - Identifier for tubeless tires

## 5 - Load Index/Speed Rating

- ☐ For example 91. Refer to ➤ [page 77](#).
- ☐ For example H. Refer to ➤ [page 78](#).

## 6 - Specified Direction of Travel of Tire/Assembly Tool

## 7 - Maximum Permissible Load

- ☐ Specifications for North America only

## 8 - Maximum Permissible Air Pressure

- ☐ Specifications for North America only

## 9 - Number of layers in the tread center and in the side-walls and information about the material

## 10 - ER number = Approval number

- ☐ The tires fulfill all European guidelines.

## 11 - Production Code/Production Date

- ☐ Identification number for manufacturer's factory, tire size and tire version
- ☐ Tire age/date of manufacture, refer to ➤ ["7.14 Tires, Aging", page 95](#)

## 12 - DOT - Department of Transportation

- ☐ Tire meets the guidelines of the American traffic authorities

## 13 - Designation for Brazil, INMETRO

## 14 - Identification for China, CCC

## 15 - Production Country

- ☐ For example: Made in Germany

## 16 - Safety Precaution for Use or Fitting of Tires

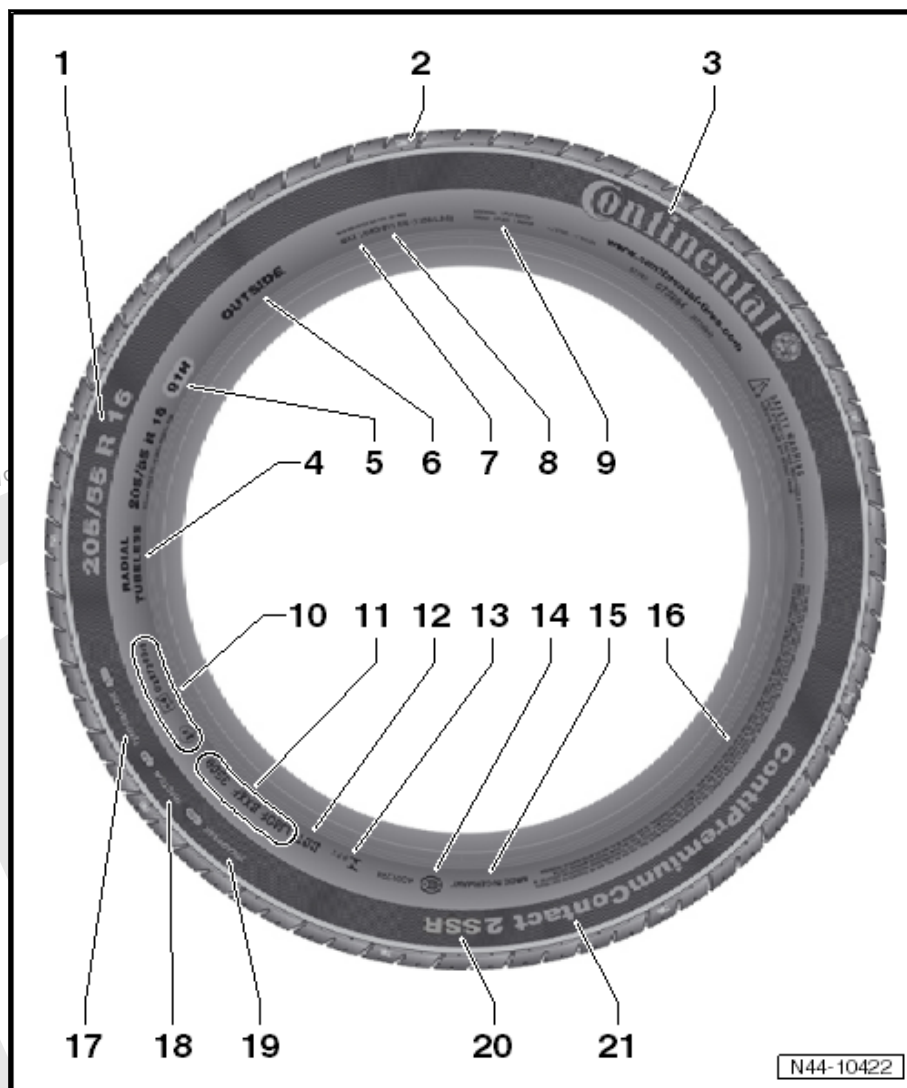
## 17 - Relative Service Life Expectancy - Abrasion Resistance

- ☐ Based on a US standard test

## 18 - Evaluation of wet braking ability A, B or C

- ☐ According to US specific test

## 19 - Temperature Resistance Evaluation A, B or C





- ☐ According to US specific test

## 20 - Run-Flat Tire Identification

- ☐ For example, Self Supporting Runflat
- ☐ Run-flat tire identification. Refer to ➔ ["7.6.2 Run-Flat Tire, Structure and Identification, SST Tire", page 85](#).

## 21 - Tread designation

- ☐ For example, ContiPremiumContact

## 7.2 Tire Dimension

### Tire Dimension Explanation

Tires	Speed	1	2	3	4	5	6	7
Summer tires	Up to 240 km/h (149.1 mph)	195	65	R	15	91	V	-
Winter Tires	Up to 160 km/h (99.4 mph)	195	65	R	15	91	Q	M + S
Winter Tires	Up to 190 km/h (118.1 mph)	195	65	R	15	91	T	M + S
Maximum high speed tire	Over 240 km/h (149.1 mph)	225	50	ZR	16	91	-	-

- 1 - Tire Width
- 2 - Aspect Ratio in %
- 3 - Tire construction code "R" (means radial)
- 4 - Rim Diameter Designation
- 5 - Load Index (LI)
- 6 - Speed Rating
- 7 - Winter Tire/Designation For All-Season Tire

## 7.3 Load Index (LI)

### Load index (LI)

The load rating can be found on the sidewall of the tire. It provides information about the maximum load that the tire can bear.

The load capacity index is located in the size designation, for example 195/65 R 15 91T, of the tire. It is indicated on the tire as a code according to ETRTO. The following table shows the load index with the corresponding load rating of the tires.

Load index	Maximum load of tire in kg
75	387
78	425
79	437
80	450
81	462
82	475
83	487
84	500
85	515



Load index	Maximum load of tire in kg
86	530
87	545
88	560
89	580
90	600
91	615
92	630
93	650
94	670
95	690
96	710
97	730
98	750
99	775
100	800
101	825
102	850
103	875
104	900
110	1060
112	1120

## 7.4 Speed Rating

### Speed rating/maximum speed

Speed Rating	High speed in km/h
L	120
M	130
N	140
P	150
Q	160
R	170
S	180
T	190
U	200
H	210
V	240
ZR	Over 240
W	270
Y	300

Winter Tires with Speed Rating "V". Refer to ➤ **7.11 Winter Tires with Speed Symbol V", page 93** .

## 7.5 EU Tire Label

⇒ [“7.5.1 EU Tire Label, Short Overview”, page 79](#)

⇒ [“7.5.2 EU Tire Label, Goals”, page 80](#)

⇒ [“7.5.3 EU Tire Label, Categories”, page 80](#)

### 7.5.1 EU Tire Label, Short Overview

Starting on 11/01/2012, tire manufacturers must comply with the new EU Regulation (EG) 1222/2009 (Tire Labeling Regulation).

The Tire Labeling Regulation requires that information pertaining to rolling resistance (fuel efficiency), wet grip and external rolling noise be printed on a uniform EU tire label. The goal of this is to increase safety and ecological and economical road transport efficiency by using tires that are safer, quieter and use less fuel.

The new EU tire label contains concrete information for seven classes from A to G.

There are 3 different categories:

#### 1 - Roll resistance (fuel efficiency)

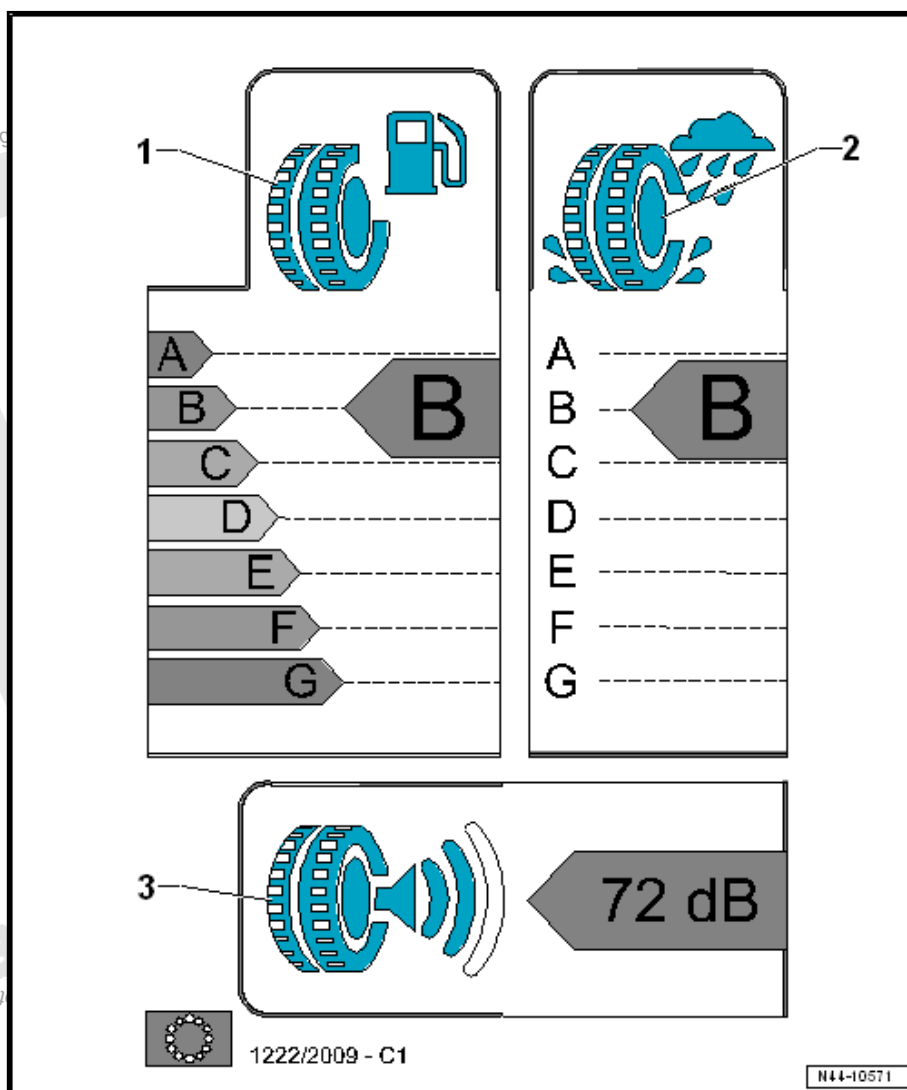
- ☐ Explanations. Refer to [⇒ page 80](#).

#### 2 - Wet Grip

- ☐ Explanations. Refer to [⇒ page 81](#).

#### 3 - Noise Emission

- ☐ Explanations. Refer to [⇒ page 82](#).







## 7.5.2 EU Tire Label, Goals

- ◆ To reduce fuel consumption
- ◆ To improve traffic safety
- ◆ To reduce traffic noise

The EU tire label provides the end-user with information about the tire's most important properties. However, it does not provide all critical safety criteria.

- ◆ Explaining additional tire properties can exert a sustained influence on the purchasing decision.
- ◆ The customer should be made aware of the limited reliability of the label regarding tire properties. For example, the label says nothing about the winter properties on winter tires.
- ◆ Tire tests remain important sources of information for dealers and end-users.

The tire test check many other performance factors, including the following:

- ◆ Aquaplaning properties
- ◆ Driving stability
- ◆ Steering precision
- ◆ Service life
- ◆ Braking properties
- ◆ Performance under winter conditions

## 7.5.3 EU Tire Label, Categories

Roll resistance. Refer to ➤ [page 80](#) .

Wet grip. Refer to ➤ [page 81](#) .

Noise emission. Refer to ➤ [page 82](#) .

### Roll resistance

Roll resistance:

- ◆ Is defined as the amount of energy used by a tire to travel to a given distance.
- ◆ This corresponds to the loss of energy in units per defined distance.
- ◆ This is expressed as a quotient of energy in Newton meters (Nm) and of distance in meters (m). Thus, the rolling resistance is expressed as a force in Newtons (N).

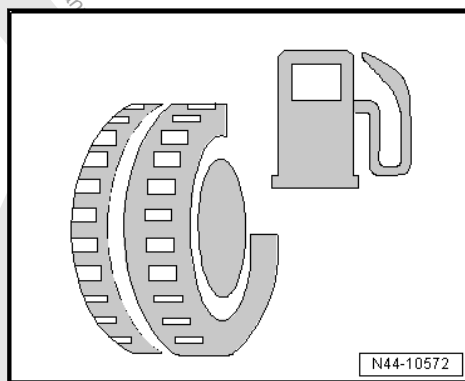
The rolling resistance of a tire is defined by the rolling resistance coefficient  $c_R$ :

$$c_R = \frac{F_R}{Z}$$

- ◆  $c_R$  - Rolling resistance coefficient
- ◆  $F_R$  - Rolling resistance force
- ◆  $Z$  - Vehicle weight (sum of all-wheel loads)

### Goal

- ◆ To reduce rolling resistance
- ◆ To economize fuel and CO<sub>2</sub>



## Evaluation

- ◆ Separated into fuel efficiency classes A to G
- ◆ Class D is not used



### Note

- ◆ The fuel efficiency classes are listed in EU Regulation (EG) 1222/2009. Tires categories are established by this regulation.
- ◆ The rolling resistance is determined by prescribed tests performed by the tire manufacturer.
- ◆ The lower the rolling resistance, the lower the fuel consumption.

A - Lowest rolling resistance coefficient = lowest fuel consumption

B - + 1.0L / 100 km, corresponds to increased consumption for A by + 1.0L / 100 km

C - + 1.2L / 100 km, corresponds to increased consumption for A by + 2.2L / 100 km

E - + 1.4L / 100 km, corresponds to increased consumption for A by + 3.6L / 100 km

F - + 1.5L / 100 km, corresponds to increased consumption for A by + 5.1L / 100 km

G - + 1.5L / 100 km, corresponds to increased consumption for A by + 6.6L / 100 km

## Wet grip

### Definition

For the wet grip, the wet grip parameter G must be determined. The wet grip parameter G is defined by testing the distance required by a standardized vehicle to brake from 80 km/h (49.7 mph) down to 20 km/h (12.4 mph) on a wet, even road surface. The test is performed using predefined standard reference test tires (SRTT), allowing for the wet grip parameter G to be determined. Mean fully developed deceleration (mfdd) is used for the test.

The mean fully developed deceleration is determined thusly:

$$\text{mfdd} = 231.48\text{S}$$

S - the braking distance between 80 km/h and 20 km/h (49.7 mph and 12.4 mph) in meters

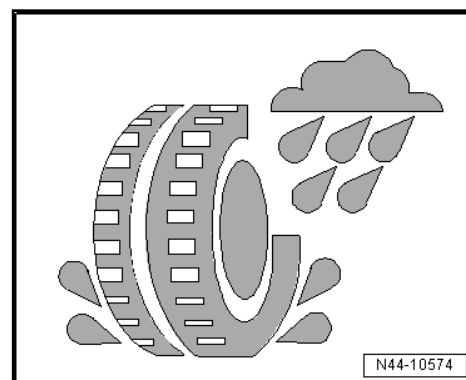
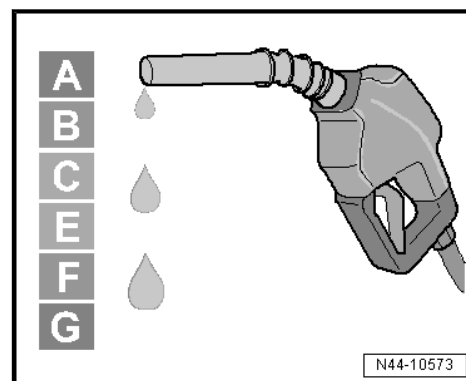
The wet grip parameter G is determined thusly:

$$G = \frac{\text{mfdd of the tire to be checked}}{\text{mfdd of the standard reference tire}}$$

mfdd - mean fully developed deceleration

### Goal

- ◆ Good wet grip on tire
- ◆ Sharp decrease in braking distance





## Evaluation

- ◆ Separated into wet grip classes A to G
- ◆ Classes D and G are not used



### Note

- ◆ *The wet grip classes are listed in EU Regulation (EG) 1222/2009. Tires categories are established by this regulation.*
- ◆ *The lower the wet grip parameter, the shorter the braking distance.*

A - Lowest Wet Grip Parameter = Shortest Braking Distance

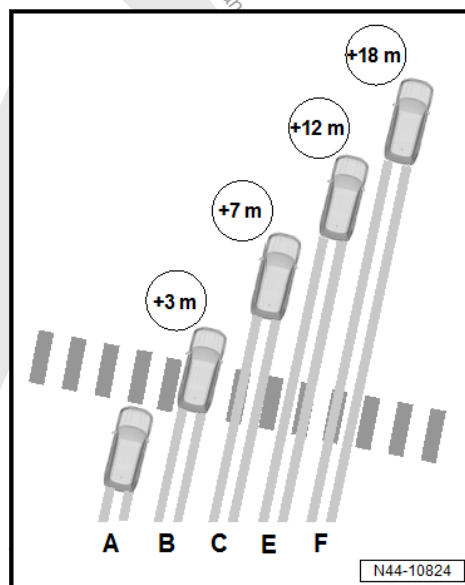
B - 3 m (9.8 feet) longer braking distance as compared to category A

C - 7 m (23 feet) longer braking distance as compared to category A

E - 12 m (39.4 feet) longer braking distance as compared to category A

F - 18 m (59.1 feet) longer braking distance as compared to category A

1 - When emergency braking at 80 km/h (49.7 mph), the difference between using class A and class F tires can be more than 18 m (59.1 feet).



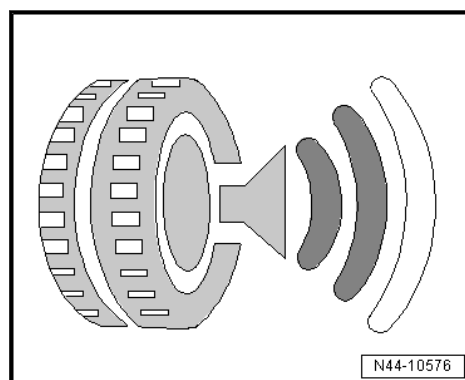
## Noise emission

### Goal

- ◆ To reduce pass-by noise
- ◆ To reduce noise impact

### Evaluation

- ◆ Take measurements from outside of the vehicle only
- ◆ Divided into three classes



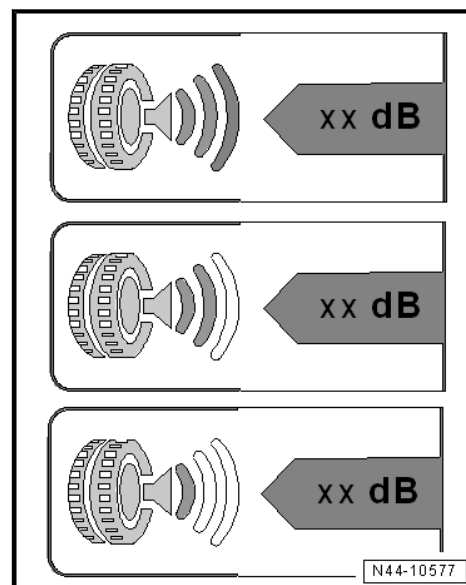


- ◆ Three black waves signify the worst performance. The tire produces external rolling noise, which falls below the current EU Directive 2001/43/EG limit. The limit surpasses the future limit set by EU Regulation (EG) 661/2009, which will go into effect in 2016.
- ◆ Two black waves: the tire noise level does not exceed the future limit set by EU Regulation (EG) 661/2009, which will go into effect in 2016.
- ◆ One black wave: the tire noise level does not exceed the future limit set by EU Regulation (EG) 661/2009, which will go into effect in 2016, by at least three decibels.



#### Note

- ◆ *Reducing the noise measured value from two black waves down to one corresponds to 3 dB, which halves the noise level.*
- ◆ *Please note that extreme tire rolling noise does not always correspond to the noise in the vehicle interior.*



## 7.6 Overview - Radial Ply Tire

⇒ ["7.6.1 Cross-Section of a Radial Ply Tire", page 83](#)

⇒ ["7.6.2 Run-Flat Tire, Structure and Identification, SST Tire", page 85](#)

⇒ ["7.6.3 Seal Inside Tires", page 86](#)

### 7.6.1 Cross-Section of a Radial Ply Tire





**1 - Tread Lug**

**2 - Tread Groove**

**3 - Tread**

**4 - Nylon Ply**

**5 - Belt Layers**

- ❑ Consists mostly of steel

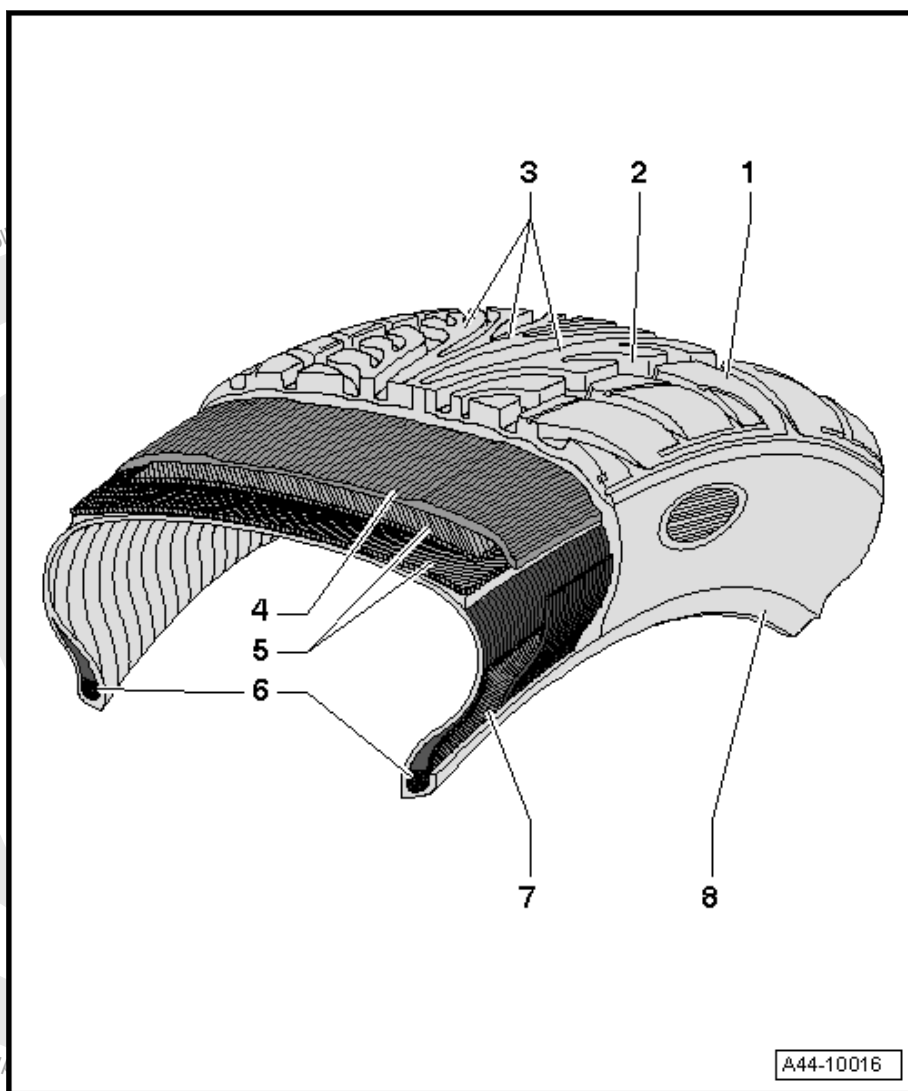
**6 - Bead Core**

- ❑ Consists of steel wires vulcanized into rubber
- ❑ Check for secure fit of the tire on the rim

**7 - Bead Reinforcement**

**8 - Rim Flange Protection**

- ❑ Protects the rim and tire from abrasion due to, for example, contact with the curb.
- ❑ Tires with flange protection are designated by the abbreviation MFS.



The nylon ply -4-, belt layers -5-, bead cores -6- and bead reinforcements -7- make up the shell. The shell is the "load-bearing structure" of the tire.



## 7.6.2 Run-Flat Tire, Structure and Identification, SST Tire

Run-Flat Tires, Dismounting and Mounting. Refer to ➔  
"4.5 Tires, Mounting", page 26 .

A tire pressure monitoring display is necessary when using run-flat tires.

Tire damage and the pressure loss resulting from it are not always recognizable.

SST tires are identified with a special code (RSC = Run-flat System Component) on the side wall.

The identification on the side wall of run-flat tires can differ depending on the manufacturer.

Self-Supporting Tire stands for a tire system with emergency running characteristics in the event of a loss of pressure. In the event of a flat tire, the driver can continue driving to a limited extent to the next workshop ➔ Owner's Manual .

### Advantage

SST tires make it possible to drive up to 50 km (31.1 miles) at a maximum of 80 km/h (49.7 mph) even with a complete loss of pressure.

Driving style, speed, road surface, weather conditions, tire condition and tire load influence the distance.

With SST tires, it is not necessary to immediately change a tire when it suffers from a complete loss of pressure (for example no tire changing in an area with low visibility or in dangerous conditions).

Braking, steering and driving performance remain for the most part even after the tire loses pressure.

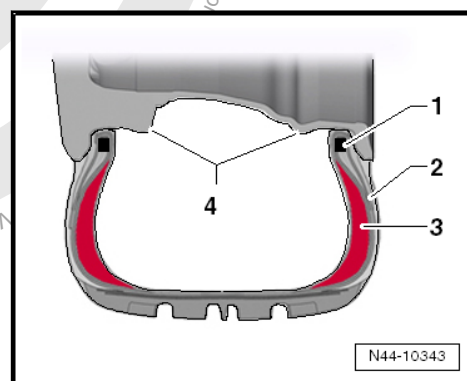
A spare wheel is no longer necessary when using SST tires. From the view of the customer, this means: saving space and weight.

### Assembly

- 1 - Bead with Bead Core
- 2 - Sidewall
- 3 - Sidewall Reinforcement
- 4 - Rim with extended hump (EH2) on both sides - required when using run-flat tires

### Technology in detail

Standard tires without emergency running characteristics



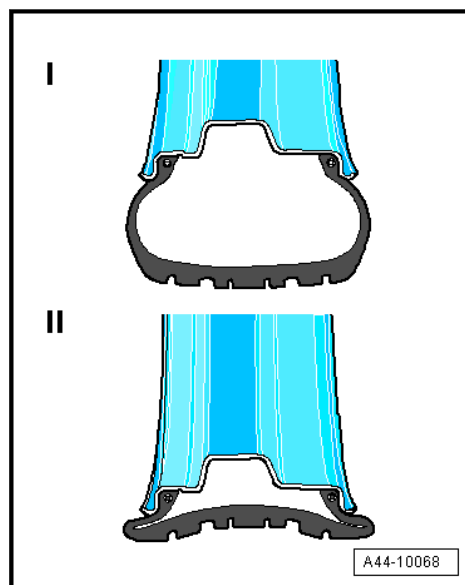




- I- standard tires with air.
- II- standard tires without air.
- If the standard tire loses air, the rim presses the side wall together. The rubber in a flat tire is heated strongly and quickly loses its properties.

#### SST tires with reinforced side wall

The self-supporting, reinforced side walls from the basis of SST technology.



- I- SST tires with air.
- II- SST tires without air.
- Especially thick side walls -A- support the empty tires on a standard rim and the vehicle remains maneuverable. A special rubber mixture reinforces the tires and supports the vehicle in an emergency.

The reinforced side walls, unlike a standard tire, prevent the tire flanks from pinching between the road and rim when flat.

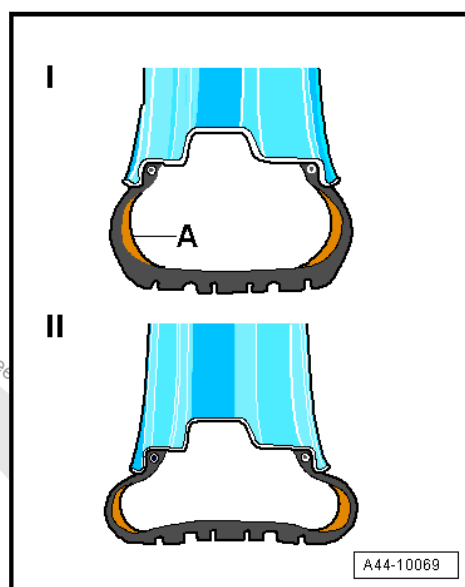
#### Difference in version H2 and EJ2 Extended Hump Rim

- ◆ The increased hump on the EH2 Extended Hump Rim prevents the SST tire from springing off when pressure is lost.
- ◆ EH2 Extended Hump Rim builds up toward the center of the wheel.



#### Note

*The clearance to the brake is reduced.*



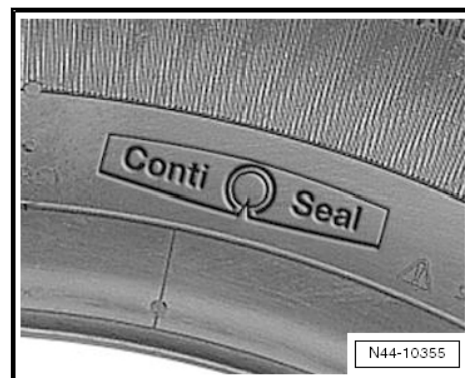
### 7.6.3 Seal Inside Tires

- ◆ Seal Inside tires are not run-flat tires. They are legally classified as standard tires. Combining Seal Inside and standard tires is permitted.
- ◆ The vehicle can be equipped with run-flat tires as an option.
- ◆ The Seal Inside technology is a system that allows the vehicle to continue driving even if the tire has been punctured by a nail or screw: a protective coating on the inside of the tire automatically seals any holes caused by a screw or a nail.
- ◆ This way no air can escape. The sealant can work on almost all types of leaks that result from objects with a diameter of up to 5 millimeters.



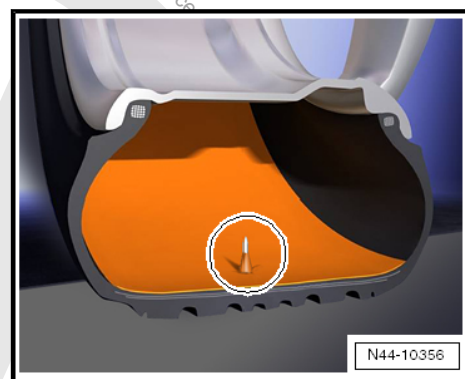
## Mobility Tires

- ◆ The seal inside technology has already been incorporated by the tire manufacturer into the tire manufacturing process.
- ◆ The seal inside technology is a self-adhering, viscous sealant, which is evenly applied to the inner side of the running surface from shoulder to shoulder.
- ◆ The sealant is an integral component of mobility tires.
- ◆ There is a special logo on the side wall of the tire which identifies it as a mobility tire.
- ◆ Example: the sidewall of a Continental tire



### Note

*The sealant is not intended to be a permanent tire repair after a puncture has happened.*

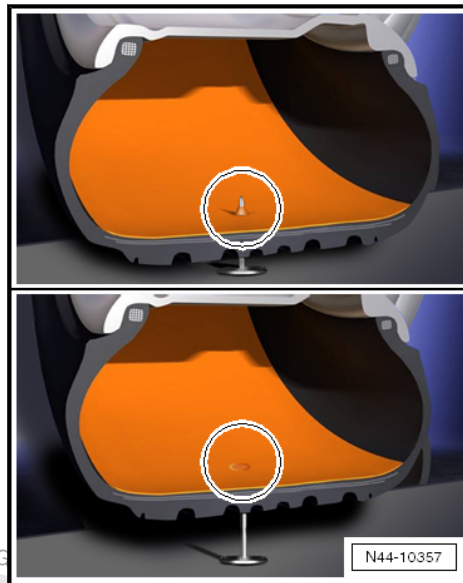




- ◆ If a foreign object with a diameter up to 5 mm punctures the running surface of a mobility tire, the sealant immediately closes the puncture and seals it to prevent air leakage.
- ◆ The sealant is designed to seal most punctures caused by a foreign object, which has a diameter up to 5 mm.
- ◆ The Seal Inside technology reduces the frequency of flat tires, but it is not intended to make it possible to drive on a tire which has minimum tire pressure or is completely flat.
- ◆ Mobility tires have all the same characteristics as tires without the Seal Inside technology.

#### Mobility Tires, Handling

- ◆ When working with mobility tires it is especially important to pay attention to cleanliness and to how the tires are stored.
- ◆ The sealant in the inner side of the tire running surface is not protected and therefore is subject to any type of dirt.
- ◆ It is recommended to store the tires in large bags or something similar.
- ◆ As with other tires, the mobility tires should be checked regularly for signs of cuts, punctures and air pressure loss.
- ◆ The tires should be inspected at least one or twice a month and/or always after a long trip.
- ◆ If punctures or damage are not taken care of in a timely manner, the result may be a loss of pressure and/or the tire could fail.
- ◆ Mobility tires with cuts or punctures must be immediately inspected.
- ◆ It must be decided if the tire should be removed and scrapped.
- ◆ Mounting and dismounting a mobility tire is identical to that of a standard tire.



## 7.7 Run-Flat Tire, SST (Self-Supporting Tire)

⇒ [“7.7.1 Run-Flat Tire, General Information”, page 88](#)

⇒ [“7.7.2 Run-Flat Tire, Retrofitting/Conditions for use of Run-Flat Tires”, page 89](#)

⇒ [“7.7.3 Run-Flat Tire, Repair”, page 90](#)

### 7.7.1 Run-Flat Tire, General Information

Run-flat tires have a reinforced sidewall in comparison to standard tires. This reduces the tendency for the sidewall to roll when there is a loss of pressure and prevents the sides of the tire from being pinched. This allows the vehicle to be driven while still maintaining close to normal driving behavior. It also eliminates the need to install the spare tire in dangerous situations such as on the highway or in poor weather conditions.

When there is a flat tire, the vehicle can still be driven to the nearest workshop (within approximately 50 km (31.1 miles)) as long as the vehicle speed (maximum 80 km/h (49.7 mph)) and driving style are adapted accordingly. Refer to the ⇒ Owner's Manual .

If there is a flat tire, the driver is ultimately responsible for checking the affected tire and deciding if it is possible to continue driving.



### -I- Tires with normal pressure

- 1 - Run-flat tires (reinforced sidewall -red-)
- 2 - Standard tires

### -II- Tires without air pressure

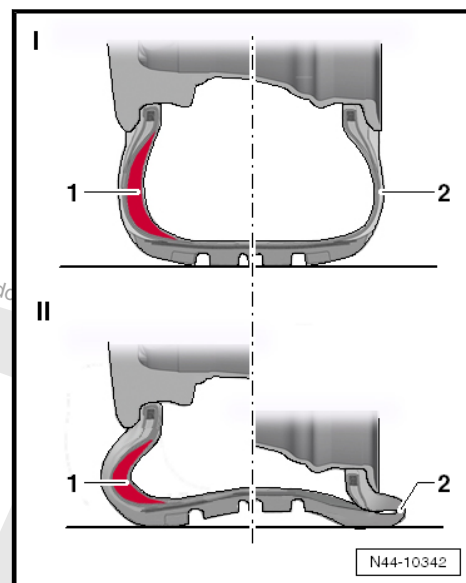
If the standard tire -2- loses pressure, the rim pushes the side wall together. When the tire is the flat, the sidewall becomes extremely hot from the rolling motion and or is pinched. This destroys the tire.

In run-flat tires -1-, the reinforced sidewall (-red-) supports the tire. Because of a special rubber compound and the reduced flexing of the reinforced sidewall, the tires does not become as hot and the vehicle can still be steered.



#### Note

Read and follow the special requirements for using run-flat tires. Refer to ➤ [“7.7.2 Run-Flat Tire, Retrofitting/Conditions for use of Run-Flat Tires”, page 89](#).



## 7.7.2 Run-Flat Tire, Retrofitting/Conditions for use of Run-Flat Tires



#### Note

Using run-flat tires on vehicles is permitted only if the run-flat tire is supplied with the vehicle either as standard equipment or as an option.

Because pressure loss in a run-flat tire is not always visible, these tires should only be used on vehicles equipped with a tire pressure monitoring system. This system warns the driver when the tire pressure falls below a certain value.

The following are permitted:

Direct measuring systems. Refer to ➤ Suspension, Wheels, Steering; Rep. Gr. 44 ; Tire Pressure Monitoring System .

Indirect measuring systems. Refer to ➤ Suspension, Wheels, Steering; Rep. Gr. 44 ; Tire Pressure Monitoring System .

Only mount run-flat tires on disc wheels with an extended double hump (extended hump - EH2). Refer to ➤ [“9.2 Identification”, page 100](#) .

Follow the assembly instructions. Refer to ➤ [“4.5 Tires, Mounting”, page 26](#) .

Do not install both run-flat tires and standard tires, even if both tires on an axle will be the same.

A standard tire can only be installed in exception cases for a short time or a limited driving distance. The specific characteristics designed for driving with a flat tire will not be available. The driver must be informed of this.



Always pay attention to the recommended tire brand. Refer to  
⇒ **Wheel and Tire Guide; Rep. Gr. 44** .

### 7.7.3 Run-Flat Tire, Repair

#### CAUTION

Tire destruction due to tire going flat.  
– Replace the tire.

#### General Information

- The wheel must be inspected before mounting, as with conventional wheel and tire systems.
- Check the rim for damage after a flat tire (true running, axial run-out, other damage) because the rim could be damaged in an emergency by driving through a pothole. Refer to ⇒ ["3 Wheel, Changing", page 16](#) .
- A damaged rim should be replaced.

### 7.8 Tires, Storing

#### Storage room

Tire storage must be:

- dark,
- dry,
- cool and
- ventilated

#### CAUTION

**Incorrect tire storage.**  
**Life-threatening situations while driving**  
– **Stored tires must not come in contact with fuel, oil, grease or chemicals under any circumstances.**

However, tire damage occurs only when the reaction time of the chemicals is long. If a few drops of fuel land on a tire during a fill-up, this is harmless.

#### Tire storage

##### Complete wheels

Tires mounted on wheels can be stored flat, stacked on upon another. When doing this, always ensure that wheels are clean and dry. The air pressure should be raised to a maximum of 3 bar (43.51 psi).

##### Tires without wheels

Tires without wheels are best stored standing vertically. If tires lie stacked upon another for longer periods of time, they will be strongly pressed together. This makes mounting more difficult because the tires do not lie on the bead seat. If the tires are stored standing vertically, it is recommended to turn them every 14 days to avoid severe flattening.

### 7.9 Tires, Reinforced, Extra Load

Some time ago, the designation "Reinforced" was replaced with the designation "Extra Load" by some tire manufacturers. In



countries outside Europe, this designation has been conventional for some time. There are no technical differences.

Some tire manufacturers also use the "XL" designation for Extra Load tires.

Tires with the designations "Reinforced" or "Extra Load (XL)" are the same.

V winter tires with XL designation have a higher load capacity than the V winter tires without this designation.

Higher speeds can be attained with XL V-winter tires, but the maximum speed of the V tires of 240 km/h (149.1 mph) is not permissible for every vehicle.

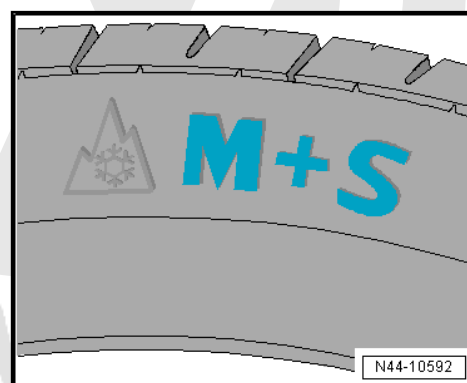
**The same conditions apply for these tires as for V winter tires without special designation!**

## 7.10 Winter Tires

### M+S-Symbol

On a "M and S tire" (mud and snow), the tread pattern, tread compound or type are designed such that the handling characteristics in snow are improved compared to a normal tire. This is especially true when initiating or maintaining vehicle motion.

The winter handling properties of tires marked with "M+S" are not defined or checked using measurements.







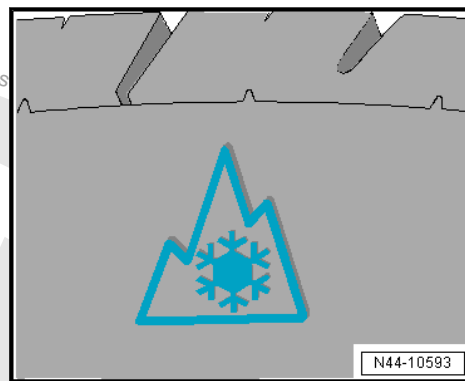
### Snowflake symbol

The "snowflake" symbol (3 Peak Mountain Snow Flake Symbol) indicates winter tires that meet the industry standard on which the American definition of winter tires is based.

These tires provide exceptionally good safety and control performance on snow, ice, and in cold weather and exceed the winter performance of tires marked only with "M+S".

### M+S designation for 4x4/SUV tires

Some vehicles come equipped with tires bearing the "M+S" symbol on the outer side. This is due to the fact that these vehicles were first introduced in North America, where "M+S" all-season tires are common. The "M+S" designation is officially defined by an EU-Regulation thusly: "A tire, whose profile and structure is designed to be more efficient in snow than a normal tire". Performance data for "M+S" denoted tires are neither defined, nor measured. The "Snowflake Symbol" (snowflake on the mountain symbol) is used in North America to specify the snow performance of winter tires. Only tires that meet or exceed these requirements may bear the "Snowflake Symbol" (snowflake on the mountain symbol).



### Using winter tires

From 05/01/2006, the road traffic regulations were changed to include the following: "Vehicle equipment must be adapted to the weather conditions. This includes suitable tires and freeze protection in the windshield washer system."

Inform the customer that since 05/01/2006, he or she is obligated to adapt vehicle equipment, especially tires, to winter weather conditions.

For the winter operation, it is recommended to mount winter tires in the sizes shown in the parts certificate table.

### Always applicable:

Equipping the vehicle with winter tires recommended in the Wheel and Tire Guide for winter operation is recommended.

The handling characteristics may be affected due to the use of winter tires the resulting changes in wheel and tire dimensions. For this reason, driving speed must be adapted to the changed handling characteristics and road conditions.

To attain best handling characteristics winter tires must be mounted on all-wheels.

If while mounting the winter tires, the vehicle is equipped with rims that are not factory-fitted, the following must be observed:

- ◆ Wheels and wheel bolts are coordinated to each other!
- ◆ When retrofitting to different wheels, the corresponding wheel nuts with the correct length and cup shape ⇒ [page 92](#) must be used. The secure seating of the wheels and the function of the brake system depend on it!
- ◆ Winter tires with tread depth of less than 4 to 5 mm are only for limited use during winter operation.
- ◆ In some countries, at least 4 mm tread depth are required for winter tires.
- ◆ The aging process reduces the particular "winter characteristics" of these tires independently from the mileage.

### Cup shape explanations

There are two cup shapes: rounded and conical.



The spherical cap has a curved surface -arrow A- on the section of a sphere. This design of the spherical cap was used for original rims.

The conical spherical cap has a flat surface -arrow B- on the section of a sphere. This design of the spherical cap is used partially on rims from the accessories program.

I - Wheel Bolt with Spherical Cap

II - Wheel Bolt with Cone-Shaped Spherical Cap

#### Vehicles with tire pressure monitoring system

On vehicles with tire pressure monitoring system, the tire pressure must be resaved or adapted after each change from summer to winter tires or vice versa. Refer to ➔ Owner's Manual .

#### Permission stipulations in Germany

Only when using winter tires is it permitted that the highest speed attainable by the vehicle lies above the highest speed of winter tires specified by the speed symbol.

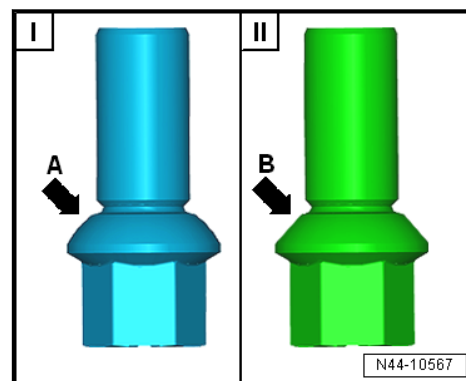
In this case, an information label must be applied with the following content:

<b>Attention, winter tires!</b>
Maximum permissible speed ...km/h



#### Note

*This information label must be in the driver's field of view!*



## 7.11 Winter Tires with Speed Symbol V

Table. Refer to ➔ **page 78** .

The tire industry delivers winter tires with V-rating also. These tires can be applied up to the maximum permissible speed  $v_{\max} = 240 \text{ km/h}$  (149.1 mph) only under certain conditions.

#### Vehicles with V-tires:

Vehicles that require V-tires according to vehicle registration, can be driven with V winter tires without limitations up to speed rating "v"  $\max = 240 \text{ km/h}$  (149.1 mph).

#### Vehicles with W-, Y- or ZR-tires:

Vehicles that require W, Y, or ZR tires according to vehicle registration, cannot be driven with V winter tires up to "v"  $\max = 240 \text{ km/h}$  (149.1 mph) under certain conditions.

#### Why?

V summer tires and V winter tires without special designation guarantee 100% of the load capacity indicated by their Load Index ("LI") only up to a speed of 210 km/h (130.5 mph).

Speeds above 210 km/h (130.5 mph) are only possible if the maximum load capacity of the tire is not exceeded. The load capacity of the tire decreases as the speed increases.

The maximum permissible axle load and the attainable maximum speed of certain vehicles are so high that the load capacity of V tires is not sufficient for speeds above 240 km/h (149.1 mph).





### Example: tires 205/55 R 16 91V

The Load Index (LI) 91 for this tire indicates a load capacity of 615 kg (1,355.84 lbs) per tire up to 210 km/h (130.5 mph).

At 240 km/h (149.1 mph), the load capacity of this tire is reduced to only 560 kg (1,234.59 lbs). For this reason, the axle load can only be maximum 1,120 kg (2,469.17 lbs).

The vehicle has an additional axle load of 1,150 kg (2,535.31 lbs) and an attainable maximum speed of 232 km/h (144.2 mph). This vehicle can be driven with V winter tires up to a speed of 230 km/h (142.9 mph).

**This applies to all V winter tires that do not have a special designation.**

Winter tires identified with Extra Load XL. Refer to ["7.9 Tires, Reinforced, Extra Load", page 90](#).

### Permission stipulations in Germany

Only when using winter tires is it permitted that the highest speed attainable by the vehicle lies above the highest speed of winter tires specified by the speed symbol.

In this case, a warning sign in the view of the driver must be applied with the following content:

Attention, winter tires!
Maximum permissible speed ...km/h

## 7.12 All-Season Tires

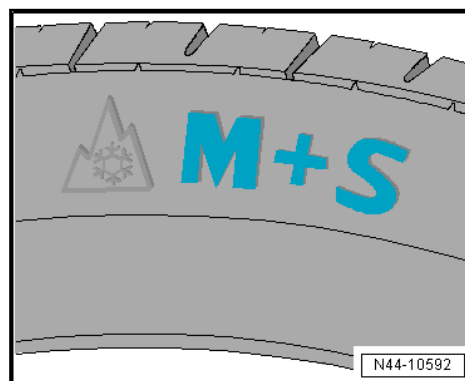
All-season tires are also called all-weather tires. All-season tires can be used for driving both in summer and in winter.

They are a balance between the properties that are required in different weather conditions. The properties of all-season tires may not be sufficient for all of the demands placed on the tire at all times of the year.

Very good winter tires are more efficient on snow and ice. Summer tires have, for example, better grip in wet conditions (except when temperatures are below approximately 7° C) and shorter braking distance in warmer temperatures.

All-season tires are marked with the -M+S- symbol. All-season tires that have exceptionally good winter properties are also marked with the snowflake symbol.

Manufacturer names such as "All weather" or "All Season" as well as special weather symbols (snow flake, leaf, sun, and rain drops) on the tire sidewall indicate all-season tires.



## 7.13 Rolling Resistance Tires

Tire label. Refer to ["7.5 EU Tire Label", page 79](#).

Rolling Resistance Tires can unlike conventional tires (tread depth approximately 7.5 mm) have a significantly lower tread depth in new condition. Tread depth between 5 and 6 mm are possible.



A significant approval criteria is that the millage on the VW wear rate must fulfill a minimum delivery rate until the wear limit of 1.6 mm remaining tread depth is reached.

The minimum delivery rate on the wear rate on the rolling resistance tires and not rolling resistance tires are identical.

The environmental compatibility of these tires is higher due to low wear pro km than conventional tires. High fuel efficiency or high electric range are also the result of low roll resistance.

Tires approved by manufacturer are rolling resistant and conform to all safety and customer relevant properties.



#### Note

*The tire wear and the vehicle range per tank/change depends on the significant measurements of the driving profile.*

The corresponding recommended tire brands should be taken from the ➔ Electronic Parts Catalog (ETKA) .

## 7.14 Tires, Aging

- ◆ Even tires that look in good shape, new or hardly use and have sufficient tread depth can age due to moisture and winter conditions.
- ◆ Tire test show that through continual development, new rubber mixtures, modern raw materials and optimizing the tire profile and profile geometry, better tires are being produced.
- ◆ The highly engineered vehicles plus constant growing customer expectations, demand economical tires that offer the highest degree of safety, driving dynamic and comfort, that only tires from the newest technology can provide.
- ◆ Tires age as a result of physical and chemical processes whereby the function can be impaired.
- ◆ Older tires may develop hairline cracks from aging.
- ◆ When tires are in constant use, the kneading activates softeners in the rubber, preventing hardening and the development of cracks.
- ◆ Therefore, one should note not just the tread depth but also the age of spare tires, stored tires and tires which are not permanently in use.
- ◆ Tire age can be determined from the DOT code which contains, among other things, the tire's production date.

Example of a DOT number through 12/31/1999

DOT .....	5	0	9	<
				stands for 199_
				Production year last digit
				Calendar week

In this example, the production date is 12/13/1999.

Example of a DOT number from 01/01/2000

DO .....	0	1	0	0
T .....				
				Production year last two digits
				Calendar week



In this example, the production date is 01/03/2000.



#### Note

- ◆ *The original characteristics of summer and winter tires are reduced by the aging process. The gripping capabilities of winter tires are especially reduced.*
- ◆ *Pay attention to the applicable country-specific requirements / laws for changing a tire.*
- ◆ *When new tires are fitted, the spare tire may also be used if it is in flawless condition. The age of the tire has a great influence on the high-speed capability of the tire. The combination of a spare tire which is several years old with new tires is possible, but it can influence the car's handling.*
- ◆ *Tires are constantly being further developed, this can lead, for example, to slight changes in the rubber compound, even if the tires are of the same make, size and tread.*

#### FWD Vehicles:



#### Note

*For driving safety reasons, tires of the same make and with the same tread should be mounted on one axle.*

#### AWD Vehicles:



#### Note

*AWD vehicles must always be equipped with four wheels with tires of the same size, construction type, tread pattern and make.*

#### Tires, replacing

Tires must be changed when:

- the legal minimum tread depth of 1.6 mm is reached.
- There is visible damage from mechanical damage.
- There is visible damage due to aging, for example tears or discolorations.

## 7.15 Tires with Rim Protector

The tire industry produces tires with rim protector for light alloy wheels (rim protector). The rim protector prevents damage to the light alloy wheels caused by contact with curbs.

Using tires with rim protector on steel wheels with wheel covers may lead to the loss of the wheel cover while driving. The cover separates from its secure seating due to the flexing of the tire.



#### NOTICE

**Tire with rim protector mounted on steel rim.**

**Full wheel cover may loosen from the rim.**

- **Do not mount tires with rim protectors on steel rims.**

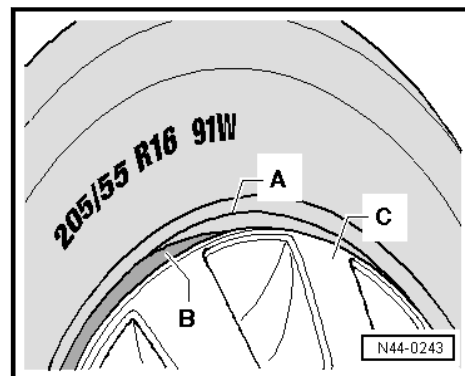


The illustration shows the non-permissible combination of steel rim, wheel cover and tire with rim protector.

A - Rim Protector

B - Rim Flange of a Steel Rim

C - Wheel Cover



## 7.16 Tire Sizes, AWD Vehicles

Note the following regarding AWD vehicles:

- ◆ Only tires having the same size and are manufactured by the same manufacturer and have the same profile may be used on the front and rear.
- ◆ Different rolling circumferences will lead to tension on the drivetrain and increased tire wear with possible damage to the drivetrain.
- ◆ This also applies to front and rear tires that are worn differently. In this case, tires with a greater tread depth are installed on the rear.

## 7.17 Increasing Temperature Due To Low Tire Pressure

The diagram shows the temperature behavior of a tire at speed of 180 km/h (111.8 mph).

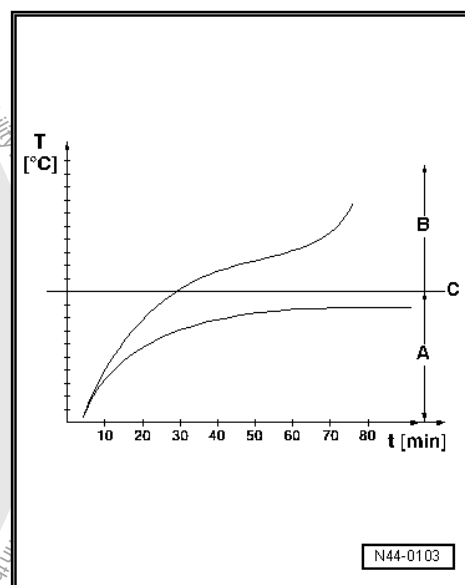
A - Normal range: when maintaining the specified tire pressure, the temperature remains stable.

B - Danger zone: when the air pressure is 0.3 bar (4.35 psi) below specification, the temperature rises to above 120 °C (248 °F) at higher speeds.

C - Critical temperature limit: the tire defect is triggered.

T - Temperature in °C

t - Driving time in minutes







## 8 Tire Sealant

⇒ ["8.1 Vehicles with Tire Mobility Kit", page 98](#)

⇒ ["8.2 Storage Life", page 98](#)

⇒ ["8.3 Disposal", page 98](#)

### 8.1 Vehicles with Tire Mobility Kit

Depending on the vehicle equipment, the vehicles are equipped with a tire mobility kit.

The tire mobility kit is located in the luggage compartment. Refer to the ⇒ Owner's Manual; Tire Mobility Kit .

The tire mobility kit contains a bottle of tire sealant and a compressor.

The tire sealant in the bottle has a limited storage life. Refer to ⇒ ["8.2 Storage Life", page 98](#) .

Observe the disposal regulations. Refer to ⇒ ["8.3 Disposal", page 98](#) .

### 8.2 Storage Life

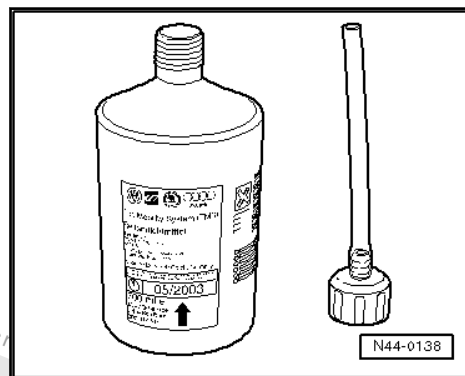
Tire sealant in the bottle has a limited storage life.

Therefore, the expiration date is indicated on the bottle -arrow-.

Replace tire sealant when minimum shelf life date has been reached (tire sealant must not be older than four years).

If the bottle was opened, for example, for a punctured tire, it must also be replaced.

Observe the disposal regulations. Refer to ⇒ ["8.3 Disposal", page 98](#) .



### 8.3 Disposal

- ◆ Tire sealant or residue from it must not be mixed with other wastes/fluids
- ◆ Accumulating fluid residue from tire sealant must be collected and placed in a plastic container. The plastic containers can be sent for recycling together with the tire sets (if the expiration date has passed).
- ◆ The return or recycling can take place using the existing workshop disposal systems
- ◆ Check with the company responsible for trash pickup for the importer.



## 9 Disc Wheel (Rim), Information

⇒ [“9.1 Disc Wheel \(Rim\), Structure”, page 99](#)

⇒ [“9.2 Identification”, page 100](#)

⇒ [“9.3 Composite Wheels”, page 101](#)

⇒ [“9.4 Light Alloy Wheels, Care and Maintenance”, page 101](#)

⇒ [“9.5 Light Alloy Wheels, Preparing”, page 102](#)

⇒ [“9.6 Hub Cap for Alloy Wheels with Open Threaded Connection, Removing and Installing”, page 102](#)

⇒ [“9.7 Decorative Trims, Replacing”, page 103](#)

⇒ [“9.8 Valve, Removing and Installing”, page 109](#)

### 9.1 Disc Wheel (Rim), Structure





### 1 - Rim Flange

- ❑ Stop for the side tire beads

### 2 - Hump (H2) on Both Bead Seats

- ❑ Prevents the tire from slipping off the bead seat when driving around tight curves
- ❑ An extended hump (EH2) is required when using run-flat tires. Refer to ➤ ["9.2 Identification", page 100](#) .

### 3 - Bed

- ❑ Makes it easier to mount the tire

### A - Rim Width

- ❑ Distance between the tire contact surfaces on both rim flanges
- ❑ Dimensions in inches

### B - Rim Diameter

- ❑ Distance between the rim contact surfaces on the opposite bead seats
- ❑ Dimensions in inches

### C - Offset

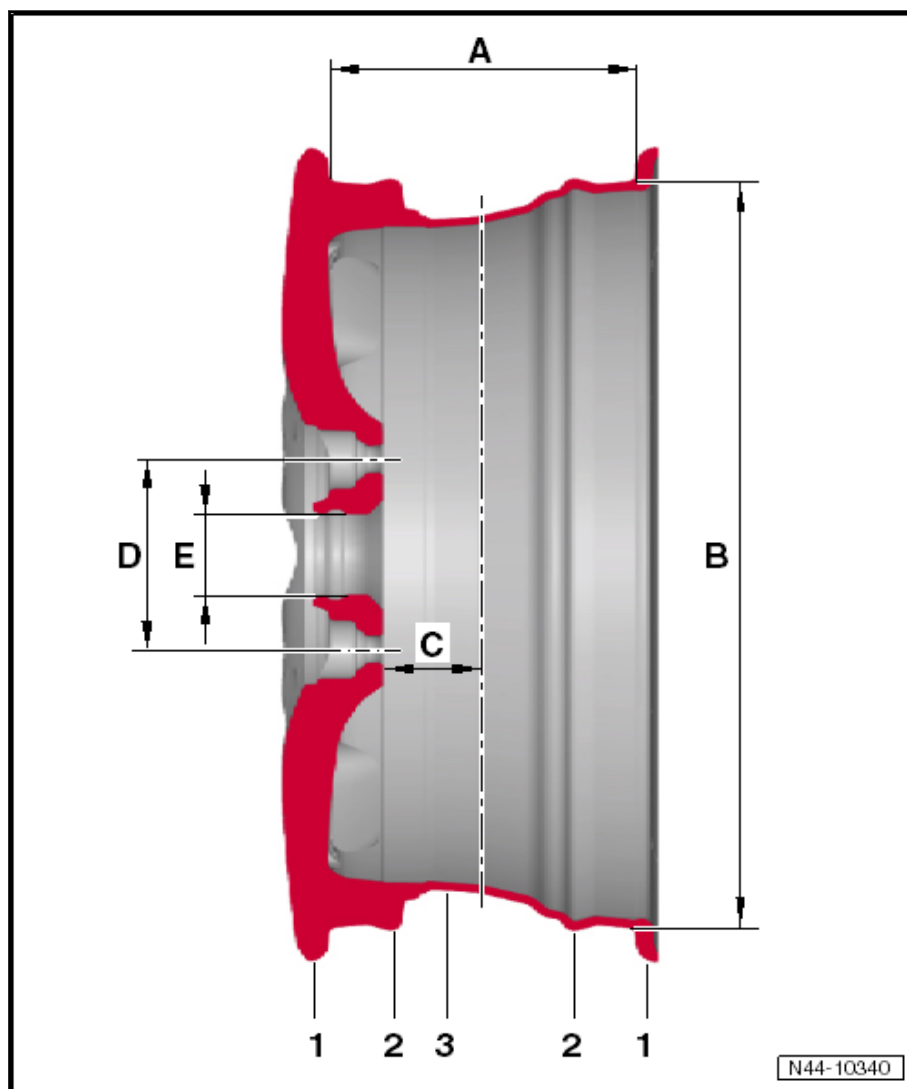
- ❑ Distance between the vertical wheel center and the inner wheel contact surface
- ❑ Dimensions in mm

### D - Pitch Circle Diameter

- ❑ Circle diameter where the wheel bolt holes are located
- ❑ Dimensions in mm

### E - Center Hole

- ❑ Enables centering
- ❑ Dimensions in mm



## 9.2 Identification

Located on the disc wheel edge (rim) is various information. Information on explicitly identifying the disc wheel in the following example:

Replacement parts number:	6E0 601 027 A
Size of disc wheel:	6 J x 15 6 - Rim width in inches J - Shape of rim flange 15 - Rim diameter in inches
Offset in mm:	43



Indication for hump on bead seat:	EH2 Extended Hump 1)
-----------------------------------	-------------------------

1) Raised round hump on both bead seats. These ensure that when using a tire with emergency mode properties in airless condition, the tire does not slip from the bead seat. Wheels with EH2 are only necessary if tires with emergency mode properties are mounted. Refer to ➔ ["7.7.1 Run-Flat Tire, General Information", page 88](#) .!

## 9.3 Composite Wheels

Composite wheels consist of various parts.

The primary components are rims and wheel discs. These components are fastened to each other with special screws and a special procedure. This ensures the wheel's function, proper seal, safety and true running. These important requirements cannot be guaranteed under shop conditions and using shop tools.



### Note

*Do not disassemble or repair composite wheels.*

## 9.4 Light Alloy Wheels, Care and Maintenance

To maintain the decorative appearance of light alloy wheels for a long time, regular care is necessary.

In particular, road salt and dust from brake abrasion must be thoroughly washed off every two weeks. Otherwise, the paint of the light alloy wheel will be attacked.

### Cleaning agent

The following are appropriate cleaning agents:

- ◆ Water or water and soft soap
- ◆ Water and diluted acetic acid
- ◆ Light alloy wheel cleaning agents without acids or harsh solvents

Do not exceed the soaking time of the cleaning agent.

The shorter the specified soaking time is, the stronger and more aggressive the cleaning solution is.

### Paint damage

Fix paint damage as soon as possible. Refer to ➔ ["9.5 Light Alloy Wheels, Preparing", page 102](#) .

### Removing adhesive residue from glued balance weights on light alloy rims

- ◆ Harsh solvents and acids attack the paint on light alloy wheels and the surface of the wheel becomes matte and milky. These agents therefore must not be used.
- ◆ To remove adhesive residue on light alloy wheels, use light alloy cleansers or benzene-based cleanser. Do not exceed the soaking time of the cleaning agent.
- ◆ After cleaning or removing adhesive residue on the tires, they must be rinsed again with water.



## 9.5 Light Alloy Wheels, Preparing

- Do not repair damaged rims by heating, welding or adding or removing material.
- Do not repair damaged or deformed rims or rims with cracked or deformed bolt holes.
- Only prepare wheels with tested and specified original paint materials.
- No warranty claims can be made against the manufacturer after preparing rims.

Do not repair rims that have cracks forming on the edges. Replace them immediately.

Cutting work, application of heat and welding applications of any kind are not permitted.

Reshaping material is not permitted.

The true running and axial run-out deviations before preparation must not exceed the manufacturing tolerance of 0.8 mm.

Only cast light alloy wheels may be primed. These wheels have the material identification AISi xx on the inside.

Forged wheels may only be painted.

The preparation is limited to painted surfaces.

Rims which are worn smooth and only feature a clear coat are excluded from repair.

Only surface damage on the visible side of the wheel may be reconditioned.

Damage must not be more than 1 mm deep.

Up to 50 mm of the rim flange may be removed and filled.

## 9.6 Hub Cap for Alloy Wheels with Open Threaded Connection, Removing and Installing

### Removing

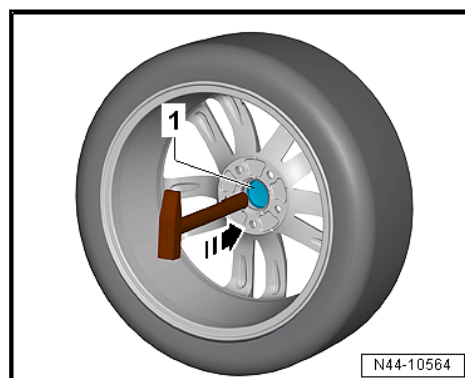
- The wheel is removed.



### Note

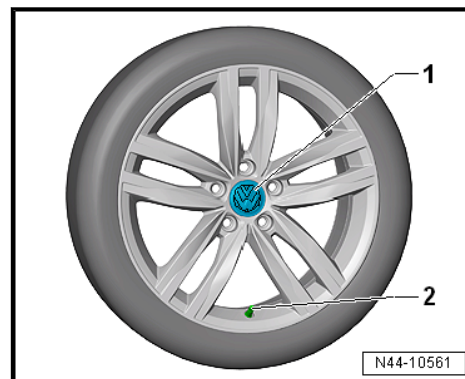
*Hold the cap secure -1- with the hammer.*

### Installing





- Hold the cap -1- flush against the opening in the aluminum rim.
- Line up the Volkswagen logo on the cap with the valve so that the logo is centered over the valve -2-.
- Press on the cap so that it is secure inside the opening in the aluminum rim.
- Make sure the cap is secure inside the aluminum rim.



## 9.7 Decorative Trims, Replacing

⇒ [“9.7.1 Decorative Trims, Replacing, Bonded Decorative Trims”, page 103](#)

⇒ [“9.7.2 Decorative Trims, Replacing, Bolted Decorative Trims”, page 107](#)

⇒ [“9.7.3 Decorative Trims, Replacing, Clipped Decorative Trims, From 2024”, page 108](#)

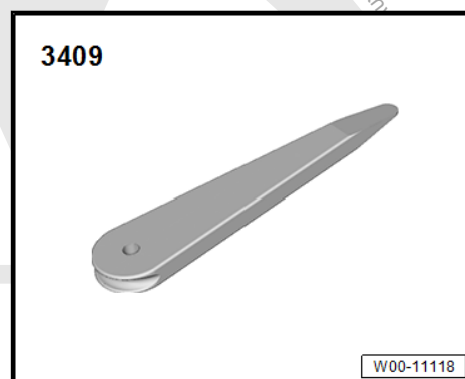
### 9.7.1 Decorative Trims, Replacing, Bonded Decorative Trims

Special tools and workshop equipment required

- ◆ Cartridge Gun - V.A.G 1628-



- ◆ Trim Removal Wedge - 3409-







◆ Wiring Harness Repair Set - Hot Air Blower - VAS 1978/14A-



**Materials**

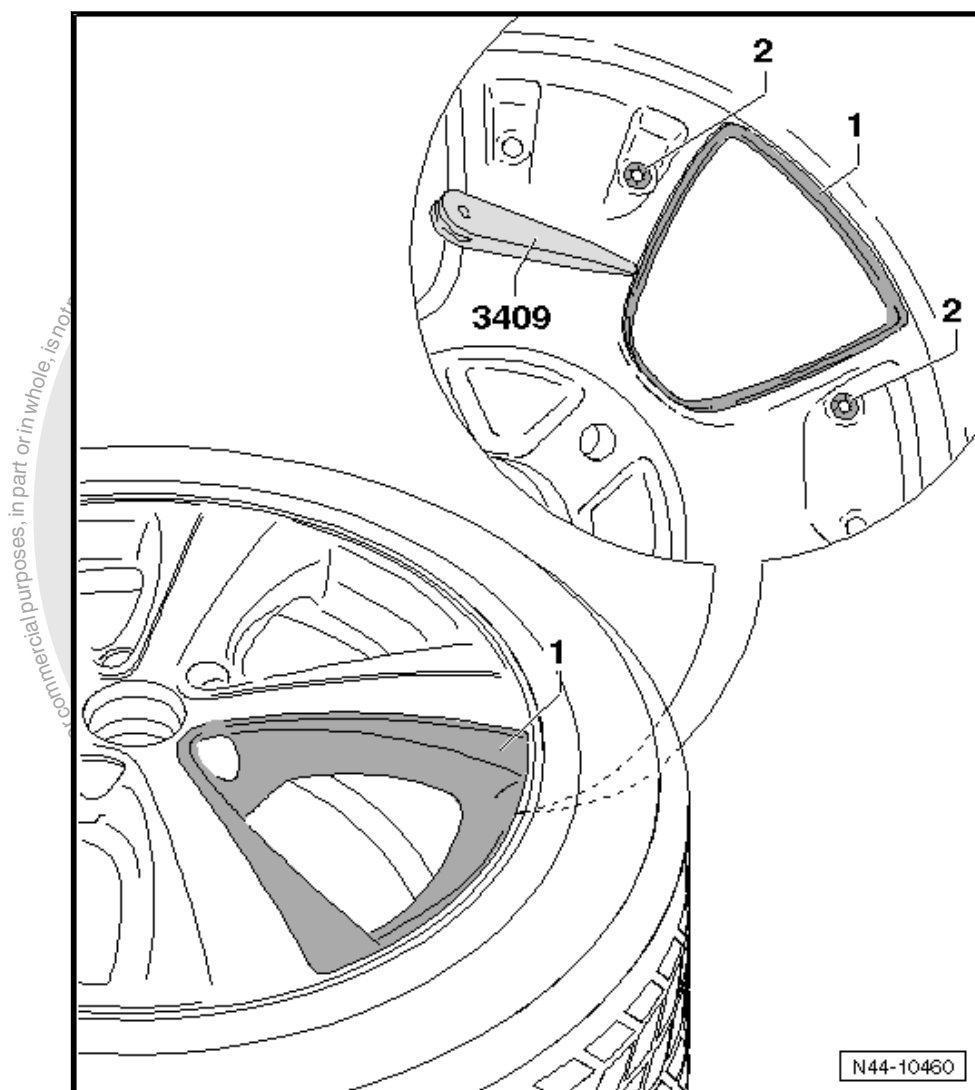
- ◆ One-Part Window Adhesive - DH 009 100 A2-
- ◆ Silicone Remover - LSE 020 100 A3-

**Decorative Trim, Removing**



**Note**

*It is not possible to remove the decorative trim without damaging it.*



- Loosen the lock washers -2- from the inside of the light alloy wheel.
- Warm the decorative trim -1- from the outside using the Wiring Harness Repair Set - Hot Air Blower - VAS1978/14A- .



#### Note

*Do not overheat tires and light alloy wheels.*

- Loosen the decorative trim -1- from the inside of the alloy wheel using the Trim Removal Wedge - 3409- .
- Grab under one corner from the outside and pull the decorative trim -1- off the light alloy wheel.



#### Note

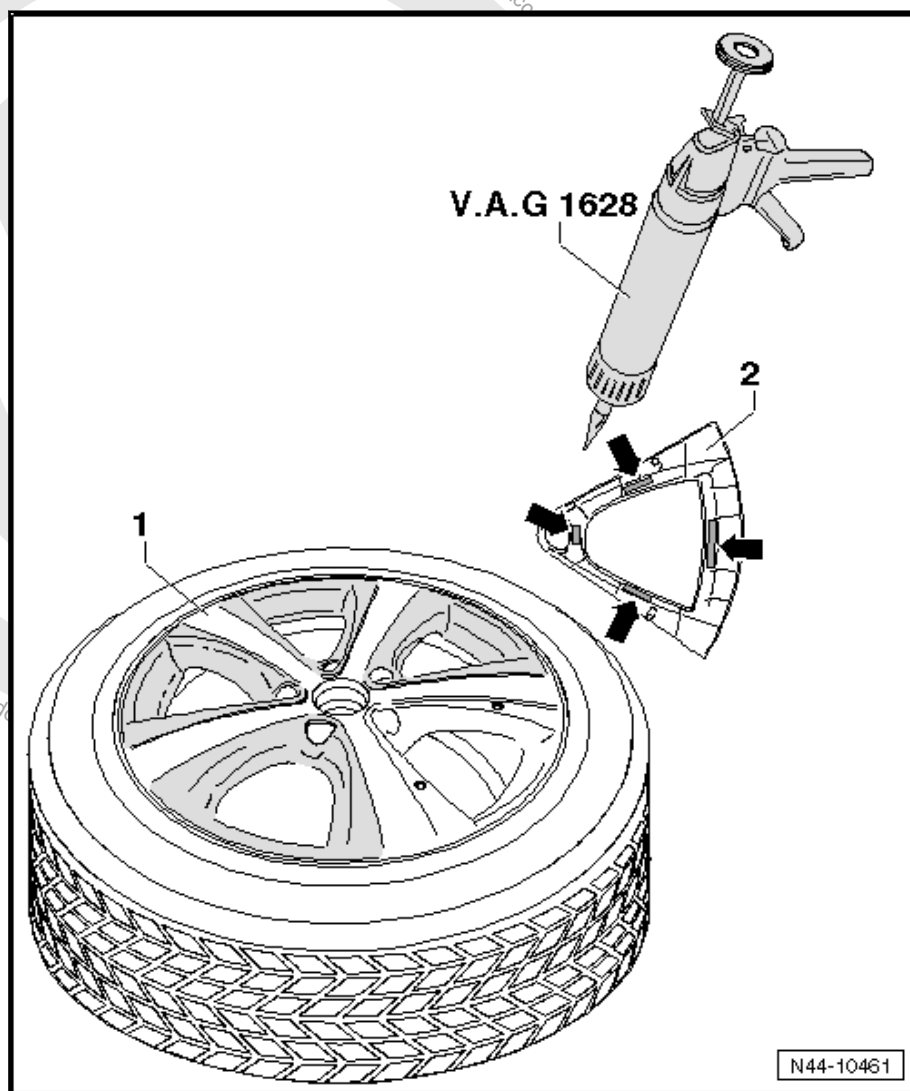
- ◆ *The adhesive points for the PUR label are cut into the light alloy wheel.*
- ◆ *The remaining material serves as the adhesive base for the new decorative trim.*
- ◆ *The new decorative trim can be installed immediately.*



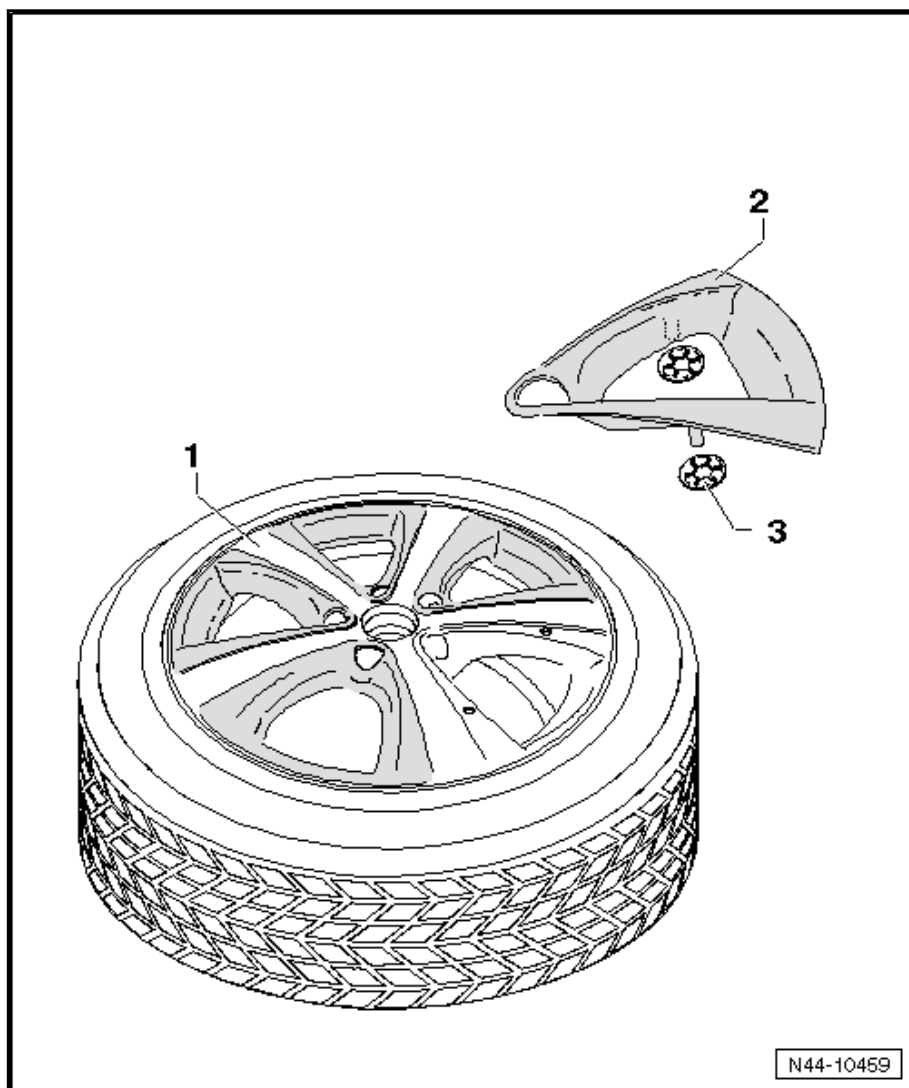
## Decorative Trim, Installing

These light alloy wheels are equipped with replaceable decoration elements. Pay attention to the following information during assembly.

- ◆ Make sure the adhesion area on the light alloy wheels and decorative trim are free of dust and grease.
- ◆ Clean the adhesion areas with Silicone Remover - LSE 020 100 A3- .



- Use the Cartridge Gun - V.A.G 1628- to apply One-Part Window Adhesive - DH 009 100 A2- on the adhesive surface -arrows-.
- Adhesive point: length = approximately 25 mm and diameter = approximately 10 mm



- Press the decorative trim -2- into the light alloy wheels -1- using firm pressure.
- Secure the decorative trim -2- to the inside of the light alloy wheel with lock washers -3-.

**Minimum curing time: 3 hours at room temperature of minimum 15 °C (59 °F).**

- The light alloy wheel must be balanced again. Refer to ["10.3 Vibration", page 117](#).

### 9.7.2 Decorative Trims, Replacing, Bolted Decorative Trims

These disc wheels are equipped with replaceable decoration elements. Pay attention to the following information during assembly.



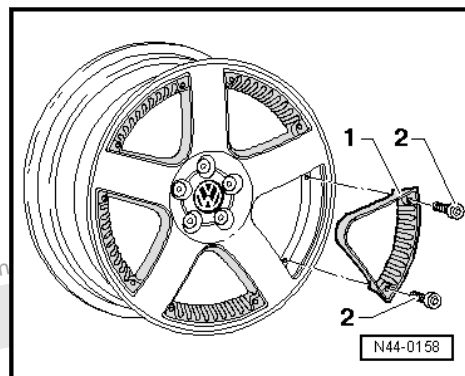
- Clean the thread in the disc wheel before screwing in the new bolts.

- Use new bolts only!

1 - Decorative Trim

2 - Hex socket bolts

Tightening specification for self-locking hex socket bolts: 5 Nm



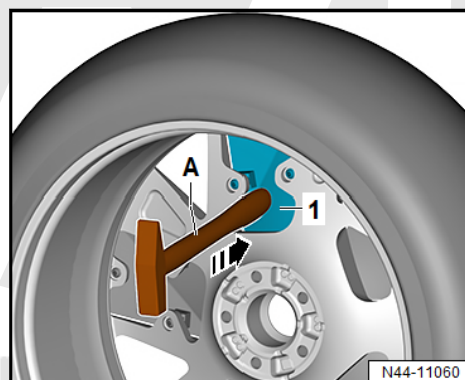
### 9.7.3 Decorative Trims, Replacing, Clipped Decorative Trims, From 2024

Clipped decorative trims cannot be removed without being destroyed.

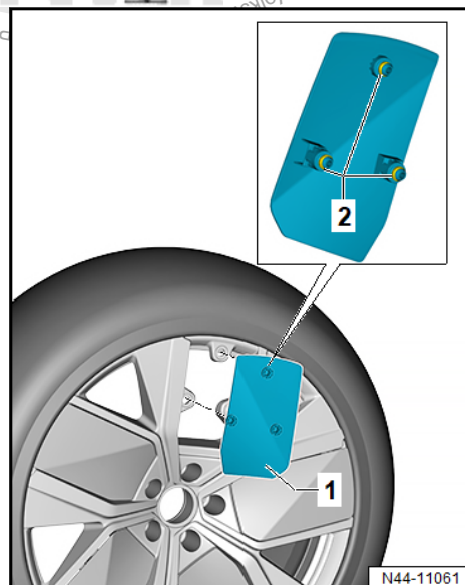
Replacing is described for a decorative trim.

#### Replace

- The wheel must be removed.
- Drive out the decorative trim -1- using a commercially available hammer handle -A- in -direction of the arrow-, at the same time hold the decorative trim -1-.



- Coat the seals -2- of the new decorative trim -1- and the rim mounts with soapy water.
- Position the new decorative trim -1- at the rim and press into the rim by hand, until it engages and aligns with the rim evenly.





## 9.8 Valve, Removing and Installing

⇒ [“9.8.1 Valve, Removing and Installing, Valve Explanations”, page 109](#)

⇒ [“9.8.2 Valve, Removing and Installing, Rubber Valve”, page 109](#)

⇒ [“9.8.3 Valve, Removing and Installing, Metal Valve”, page 110](#)

### 9.8.1 Valve, Removing and Installing, Valve Explanations

#### 1. Valve Body

- 1 - Valve Body
- 2 - Valve Insert
- 3 - Valve Cap

The rubber valve for tubeless tires is designed to seal air-tight in the hole in the rim. The elastic material of the rubber body presses itself tightly into the hole in the rim.

When valves with threaded metal feet are used, a rubber seal is used to seal the rim. The area around the edge of the valve hole is a sealing area. Therefore, they must be free of rust, dirt and damage.

#### 2. Valve Insert

The valve insert has the most important job in the valve. It creates a seal and enables the regulation of the air pressure. The small plate seal on the valve core can only do its job when it is free of impurities, dirt and moisture. The compressed air system must be free of water and oil!

#### 3. Valve Cap

A valve cap must always be screwed onto the valves. It prevents dirt from getting into the valve. Dirt which may be in the valve would reach the seal of the valve plate when the tire is inflated and cause a leak.

The valve must be replaced every time a new tire is fitted.

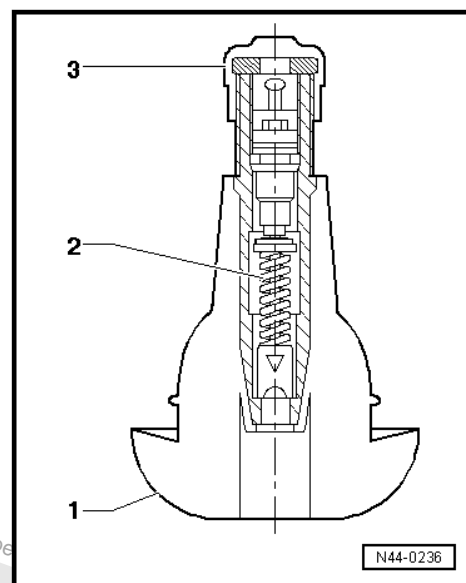
If the vehicle is driven without caps on the valves, there is the danger that dirt may get into the valve. This leads to gradual loss of air and therefore lead to the destruction of the tire:

- ◆ Separation of shell and rubber. Refer to ⇒ [Fig. ““Separation of shell and rubber””, page 124](#) .
- ◆ Wide circumferential furrows in the area of the bead. Refer to ⇒ [Fig. ““Tires with wide grooves along the circumference in the area of the bead””, page 124](#) .
- ◆ Torn-out tread or protector. Refer to ⇒ [Fig. ““Tires with torn-out tread””, page 123](#) .

#### ! NOTICE

No air-tight seal due to an incorrectly tightened valve cap.

- Install the valve cap firmly on the valve.



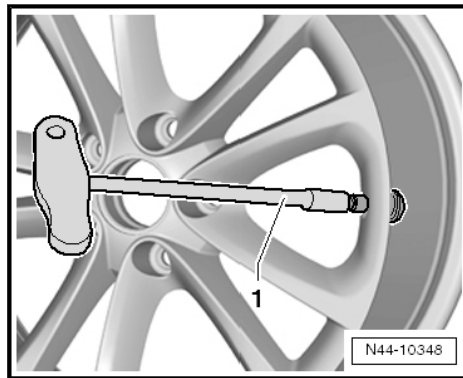
### 9.8.2 Valve, Removing and Installing, Rubber Valve

- Make sure wheel rim is clean.





- Using the Valve Fitting Tool - VAS 6459- -1-, insert a new tire valve.
- Remove the valve insert.
- Inflate the tire to approximately 3 to 4 bar (43.51 to 58.02 psi); the tire bead must slip audibly over the rim hump when doing this.
- Install the valve insert.
- Check the tire pressure for specified pressure.
- Balance the tire.



### 9.8.3 Valve, Removing and Installing, Metal Valve

Perform the following procedures:

#### Removing

- Remove the Tire Pressure Monitoring Sensor . Refer to ⇒ [“5.4.2 Tire Pressure Monitoring Sensor, Removing and Installing, without Valve, Version 1, Service Version”, page 56](#) .
- Remove the nut -1- from the metal valve.
- Counterhold -arrow- the metal valve using a retainer (for example 2 mm spiral bore) while doing so.

#### Installing



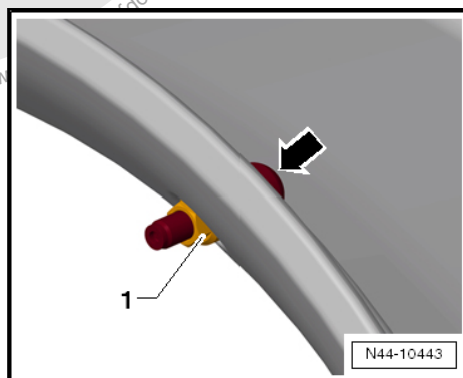
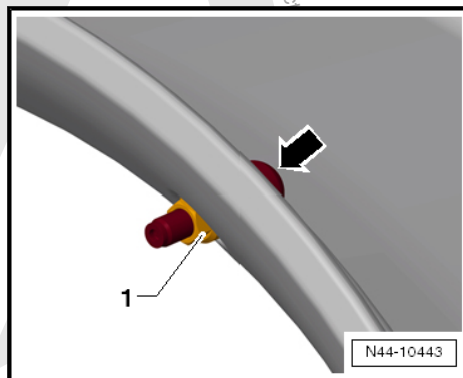
#### Note

- ◆ *Only apply the specified torque to tighten the nut for the metal valve.*
- ◆ *Tightening more is not permitted because it damages the seal.*

- Tighten the nut -1- of the metal valve.
- Counterhold -arrow- the metal valve using a retainer (for example 2 mm spiral bore) while doing so.
- Install the Tire Pressure Monitoring Sensor . Refer to ⇒ [“5.4.2 Tire Pressure Monitoring Sensor, Removing and Installing, without Valve, Version 1, Service Version”, page 56](#) .

#### Tightening Specifications

- ◆ Refer to ⇒ [“5.3.2 Overview - Tire Pressure Monitoring Sensor without Valve, Version 1”, page 51](#)





## 10 Handling Problems

⇒ ["10.1 Driving Noise", page 111](#)

⇒ ["10.2 Vehicle Pulls to One Side", page 113](#)

⇒ ["10.3 Vibration", page 117](#)

⇒ ["10.4 Flat Spots, Correcting", page 118](#)

### 10.1 Driving Noise

⇒ ["10.1.1 Driving Noises, General Information", page 111](#)

⇒ ["10.1.2 Wear Spots", page 112](#)

#### 10.1.1 Driving Noises, General Information

Rolling noise perceived by the human ear is caused by vibrations transmitted from the noise source to the ear via the air.

Here we are interested in noises created by certain characteristics of the tires as well as the effects of rolling (noise source).

The cause for the noise generation depends primarily on the combination of road surface and tire.

The surface structure and material of the road surface also have a strong influence on the driving noise. For example, the noise level on a wet road is substantially higher than on a dry road.

The design of the tread has a great influence on the noise generation. Tires with cross grooves at an angle of 90° are louder than tires with grooves running diagonally.

Small tread blocks are unstable. Due to strong deformation, the air is excited by the rolling tires. Air vibrations occur, which will generate noises.

Wider tires are louder. They require more tread grooves for water displacement. Air is displaced by these tread grooves while rolling, which also cause air vibrations.

Other effects which also have an influence on noise generation:

- ◆ "Tire vibration" is the main cause of driving noise. The noise is generated by the excitation of the air column in the grooves.
- ◆ "Air pumping" is the compression and expansion of air as the contact patch comes in contact with the road surface and the tread blocks are deformed.

#### Aid to reasoning of driving noise

Noise generation is created chiefly by tires and the road surface.

Influencing factors of road surface are roughness, structure and material.

Influencing factors for tires fall under different tire and rim widths. A wider tire generates more noise due to its wider contact patch than a narrower tire does, because more air is displaced and a greater "mass" is caused to vibrate.

A wider rim also causes the tire to have a wider contact patch. The effects on noise generation are basically the same as those of a wider tire. In addition, the noise suppression characteristics of the tire can, under certain circumstances, be negatively affected by the wider rim.



The tire rolling noise is significantly noticeable in the rear of vehicles with front engines, because wind and engine noise are less audible in the back.

### 10.1.2 Wear Spots

Wear spots are caused by a hard stop with locked wheels whereby the rubber compound is abraded from the contact surface.

When the tires slide across the road surface, frictional heat is generated which reduces the abrasion resistance on the tread compound.

Even the most abrasion resistant tread compound cannot prevent wear spots which can occur during extreme braking.

Even ABS cannot completely prevent brief locking and the resulting slightly flat spots.

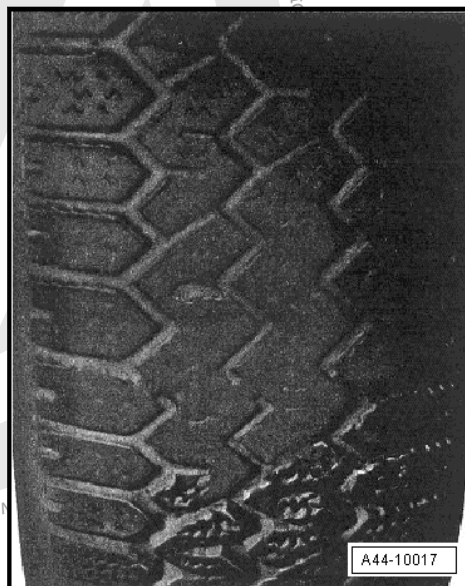
The degree of abrasion is primarily dependent on the vehicle speed, road surface and tire load. For clarification see the following examples.

If a vehicle with locked front wheels is decelerated until it comes to a stop on a dry road surface, the rubber abrasion on the post card sized contact patch is approximately:

- ◆ from 57 km/h (35.4 mph) = 23.8 m (78.1 feet) braking distance, up to 2.0 mm,
- ◆ from 75 km/h (46.6 mph) = 41.8 m (137.1 feet) braking distance, up to 3.3 mm,
- ◆ from 92 km/h (57.2 mph) = 71.6 m (234.9 feet) braking distance, up to 4.8 mm.

#### Wear spots in tread

Tires with this type of damage cannot be used and must be replaced.





## 10.2 Vehicle Pulls to One Side

⇒ [“10.2.1 General Information”, page 113](#)

⇒ [“10.2.2 Taper”, page 113](#)

⇒ [“10.2.3 Corrective Action When Vehicle Pulls to One Side”, page 114](#)

⇒ [“10.2.4 Targeted Rotating of Wheels for Non-Directional Tires”, page 115](#)

⇒ [“10.2.5 Wheels, Targeted Rotating for Directional Tires”, page 116](#)

### 10.2.1 General Information

Perform a road test to determine if a vehicle pulls to one side and if so, when and to which side. If the vehicle pulls to one side. Refer to ⇒ [“10.2.3 Corrective Action When Vehicle Pulls to One Side”, page 114](#).

If the vehicle alignment is measured, submit the measurement printout and the complaint report with the tire.

Manufacturer's tolerances can lead to taper in the tire construction. This results in a side force when the tire rolls, which acts directly on the suspension and can therefore lead to vehicle self-steering behavior. Targeted rotation of the wheels can balance out this self-steering behavior.

### 10.2.2 Taper

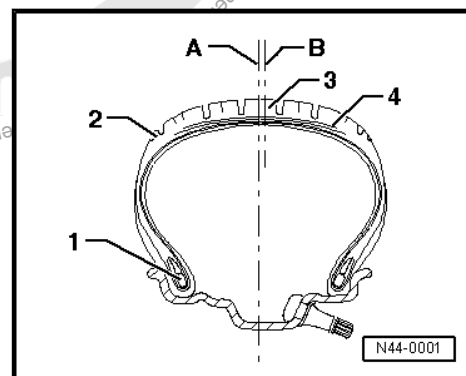
Taper is caused by slightly offsetting the tread and/or the belt by a few tenths of a millimeter from the geometric center of the tire. Taper cannot be recognized visually nor can it be measured with workshop equipment.

#### Components of a tire

- 1 - Bead
- 2 - Shoulder
- 3 - Tread
- 4 - Steel Belt

A - Geometric Center of Tire

B - Actual Position of Belt. It can be offset to inside or outside.





Shown out of proportion to provide a better illustration.

1 - Belt/Tread Offset

F1 - Unequal Wheel Forces

F2 - Unequal Wheel Forces

Fk - Force of Taper

The offset produces differences in rigidity of the inner and outer shoulders of the tire, which lead to differing forces on the wheel contact surface. Due to this, the belt and tread will not be pressed against the road surface with the same force (F1, F2). A taper forms. The resulting force (force of taper Fk) can become so large depending on speed, that the vehicle pulls to one side.

If the force (Fk) on one wheel of the axle is, for example, 50 Newton and on the other wheel also 50 Newton, and both forces are exerted in the same direction, the forces are additive. Reversing a tire on the rim can compensate for the pulling because the forces then act against each other.

Because the direction in which the force of taper is exerted is not visible at the tire, only road tests and targeted rotation of wheels and tires can establish which tires cause the pulling.

The tire consists of numerous components and materials which are vulcanized to a single part at the end of a complicated manufacturing procedure. This leads to differing construction tolerances which can make themselves noticeable through more or less strong lateral forces (lateral forces of taper). These forces can also develop in new tires.

#### One-sided pulling on front axle

Pulling to one side can be caused by the suspension. However, experience shows that in 90% of all complaints, the tires cause pulling to one side.

#### One-sided pulling during normal driving style

On a straight, level road surface, the vehicle wants to pull to one side at a constant speed or with moderate acceleration. At the same time force can be felt at the steering wheel.

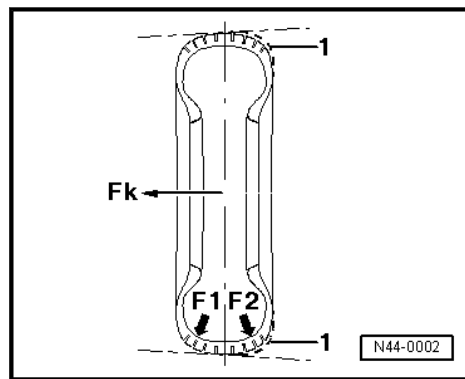
#### One-sided pulling during strong accelerating

Pulling to one side during fast acceleration is, in part, due to the design of vehicles with FWD. Various frictional conditions of left and right wheels, for example, possible irregularities in the road surface (pot holes) and consequently varying adhesion to ground have a substantial influence on the handling characteristics. This does not constitute a complaint in the sense of the warranty.

### 10.2.3 Corrective Action When Vehicle Pulls to One Side

#### Test conditions before and during the road test

- Check all suspension components on front and rear axle for damage.
- Check tire pressure and correct if necessary.
- Check the tires for external damage. Holes, cuts, bulges in the side wall, flat spots from braking and/or damage to the tread.
- Ask the customer if a tire had been damaged by a nail or similar object and perhaps repaired by a tire dealer. Such tires may have to be replaced.







- Check tires for even wear and tread depth.
- Are all tires of the same type, manufacture and tread pattern?
- If the tires are non-directional, ensure that all DOT classifications on the tire face outwards. It may be that the vehicle's wheels and tires were already changed around at an earlier date.
- Are the tire brands factory recommended as initial equipment?
- For the road test, use a level, straight driving surface that does not slope off to one side and does not have ruts.
- Perform the road test with the customer under the conditions specified above. The customer should demonstrate the problem.



#### Note

*There should not be any crosswind when road test takes place.*

If the complaint is justified, it is recommend to rotate the wheels and tires as described on the following pages.

Before starting the procedures, pay attention to the following.



#### Note


- ◆ *Mark tires/wheels before the first rotation, for example LF, RF, LR, RR.*
- ◆ *After rotating wheels or reversing the tire on its rim, observe very carefully how the vehicle behaves during the road test. Note what was replaced and how.*
- ◆ *The intensity or any possible change to the one-sided pulling should be assessed.*
- ◆ *To do this, it is absolutely essential that the road tests are always performed by the same person on the same road. It is best to drive the "test course" in both directions.*
- ◆ *Replacing a tire with a new tire does not guarantee that pulling to one side will be eliminated. Therefore, it is recommended to perform a targeted exchange of the wheels as described below.*
- ◆ *If there are large differences in the tread depth of the tires on the front and rear axles, the tires with the deeper tread should always be mounted on the rear axle.*

### 10.2.4 Targeted Rotating of Wheels for Non-Directional Tires

↓	
Perform a road test to determine if a vehicle pulls to one side and if so, when and to which side	
↓	
If the vehicle pulls to one side, swap the front wheels.	
↓	
Road Test, Performing	
Vehicle travels straight - END	
Vehicle pulls opposite	Vehicle pulls to the same side
↓	↓





Reverse one tire on its rim on the front axle (reverse the direction of travel)		Rotate wheels from front to back		
↓		↓		
Road Test, Performing		Road Test, Performing		
Vehicle travels straight - END		Vehicle travels straight - END		
Vehicle does not travel straight		Vehicle does not travel straight		
↓		↓		
Swap front wheels and swap back wheels		Vehicle pulls opposite	No change	
↓		↓	↓	
Road Test, Performing		Reverse one tire on its rim on the front axle (reverse the direction of travel)	Check alignment of front and rear axles, adjust if necessary.  If adjustment is correct, inform Product Support.	
Vehicle travels straight - END				
Vehicle does not travel straight				
↓				
Swap the front wheels				
↓		↓		
Road Test, Performing		Road Test, Performing	 Copyright by Volkswagen AG.	
Vehicle travels straight - END	Vehicle does not travel straight	Vehicle travels straight - END		
	↓	Vehicle does not travel straight		
	Install new tires on front axle	Install new tires on front axle		
	↓	↓		
	Road Test, Performing	Road Test, Performing		
	Vehicle travels straight - END	Vehicle travels straight - END		
	↓	↓		
Vehicle does not travel straight, inform Product Support				

## 10.2.5 Wheels, Targeted Rotating for Directional Tires

↓
Perform a road test to determine if a vehicle pulls to one side and if so, when and to which side
↓
If the vehicle pulls to one side, swap wheel with tire front and back.
↓
Road Test, Performing
Vehicle travels straight - END
Vehicle does not travel straight
↓
First, replace one tire on the front axle
↓
Road Test, Performing
Vehicle travels straight - END
Vehicle does not travel straight



↓
Replace second tire on the front axle
↓
Road Test, Performing
Vehicle travels straight - END
Vehicle does not travel straight
↓
Measure vehicle at front and back
↓
Road Test, Performing
Vehicle travels straight - END
Vehicle does not travel straight, inform Product Support

## 10.3 Vibration

⇒ [“10.3.1 Vibration, Causes for Vibration”, page 117](#)

⇒ [“10.3.2 Vibration, Road Test, Performing Before Balancing”, page 117](#)

⇒ [“10.3.3 Vibration, Vibration Control System”, page 118](#)

### 10.3.1 Vibration, Causes for Vibration

There are many causes for vibration. Vibration can also be caused by tire wear, among other things. Tire wear caused by driving does not always develop evenly over the entire tread. Due to this, a slight imbalance develops which disturbs the smoothness of the formerly accurately balanced wheel.

This slight imbalance cannot yet be felt in the steering wheel, but it is present. It increases the tire wear and consequently reduces the service life of the tire.

#### Recommendation

In order to guarantee over the entire service life of a tire

- optimal safety,
- optimal smoothness and
- uniform wear

It is recommended that wheels/tires be balanced at least two times within the tire's service life.

### 10.3.2 Vibration, Road Test, Performing Before Balancing

If a vehicle comes to the workshop with the complaint “vibration”, a road test must be performed before balancing the wheels.

- ◆ That way, information about the type of vibration can be obtained.
- ◆ Observe at which speed range the disturbance takes place.
- Raise the vehicle on the platform immediately after the road test.
- Mark the component location on the tire.



Component location of tire	Identification with ...
Left front tire	LF
Right front tire	RF
Left rear tire	LR
Right rear tire	RR

- Remove the wheels from the vehicle.
- Balance the wheels.

### 10.3.3 Vibration, Vibration Control System

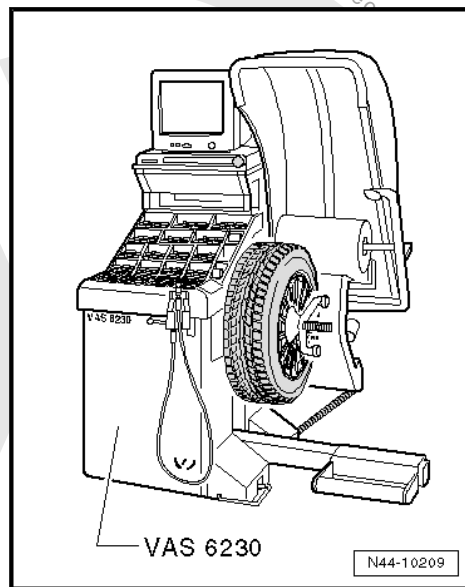
Expanded functions can be performed using Hunter RFT33VAG Road Force Touch™ Wheel Balancer - VAS 6230 B4- in addition to the previously known balancers.

A special characteristic of this system is testing the radial force of wheel/tire during rolling.

For this purpose, a roller presses a force of approximately 635 kg (1,399.93 lbs) against the wheel. This simulates the tire contact force against the road surface while driving.

Tire contact forces fluctuate due to radial and lateral run-out and differing stiffness in the tires.

The -VAS 6230 B4- detects and stores the position of the maximum measured radial force in the tires. After that, the position of smallest dimension between rim flange and disc wheel center is measured.



### 10.4 Flat Spots, Correcting

- Locate the flat spot in the tire from standing. Refer to ["11.1 Flat Spots", page 120](#).

#### Flat spots, correcting

- ◆ Flat spots cannot be removed from tires with workshop equipment.
- ◆ Such flat spots can be "driven out" only by driving the car until the tires are warm.
- ◆ We do not recommend the following method during cold or winter weather.

#### Requirements/Conditions

- Check the tire pressure and correct, if necessary.
- If possible, drive the vehicle on an expressway.
- If the traffic and road conditions permit, drive at a speed of 120 km/h to 150 km/h (74.6 mph to 93.2 mph) for a distance of 20 to 30 km (12.4 to 18.6 miles).



#### NOTICE

**Personal risk and risk for other drivers while test driving.**

- Always observe the local applicable law.
- Secure testing equipment.
- Lift the vehicle immediately after the performing the road test.



- Remove the wheels from the vehicle.
- Balance the wheels on the stationary balancing machine.  
Refer to ➔ [“4.9 Wheel, Balancing”, page 35](#) .





## 11 Tires, Evaluating

⇒ [“11.1 Flat Spots”, page 120](#)

⇒ [“11.2 Cracking”, page 120](#)

⇒ [“11.3 Heel and Toe Wear”, page 121](#)

⇒ [“11.4 Wear Spots”, page 121](#)

⇒ [“11.5 Tire Sidewall Swelling”, page 121](#)

⇒ [“11.6 Cuts”, page 123](#)

⇒ [“11.7 Foreign Object Damage”, page 123](#)

⇒ [“11.8 Disintegrated Tread”, page 123](#)

⇒ [“11.9 Tires, Damage from Low Tire Pressure”, page 124](#)

⇒ [“11.10 Inspecting Tires”, page 124](#)

⇒ [“11.11 Mounting Damage”, page 125](#)

### 11.1 Flat Spots

#### What is a flat spot from standing?

Terms like flat portion, flattening, are also used as a term for flat spots from standing.

Flat spots from standing cause vibration, like an incorrectly balanced wheel. It is important to recognize a flat spot in the tread from standing as such!

Flat spots from standing cannot be corrected by balancing, and can occur again at any time under various circumstances. Flat spots from standing can be corrected without complicated special tools. Providing that the flat spot was not caused by wheel lock during hard braking. Refer to ⇒ [“10.1.2 Wear Spots”, page 112](#).



#### Note

*Wear spots due to wheel lock are irreparable! Tires with such damage must be replaced.*

#### Causes of flat spots from standing:

- ◆ The vehicle stands for several weeks in a location without being moved.
- ◆ Tire pressure is too low.
- ◆ The vehicle was placed in a paint system drying cabinet after painting.
- ◆ The vehicle was parked with warm tires in a cold garage or similar for a long time. In this case, a flat spot can develop overnight.
- Correct the flat spots. Refer to ⇒ [“10.4 Flat Spots, Correcting”, page 118](#).

### 11.2 Cracking

Cracking is the term for shallow cracks in the sidewall of the tire.

They run starting from the bead in the direction of the tire shoulder. See Illustration Refer to ⇒ [Fig. “Components of a tire”, page 113](#) for the mentioned components.



The cause is the increase in material at the joints of the tire components.

Cracking has no effect on:

- ◆ safety,
- ◆ service life,
- ◆ vehicle handling
- ◆ other characteristics of the tire.

Cracks can be of varying visibility. removing the tire from the rim or an examination is not necessary.

How did the cracks form?

Modern steel belted tires are constructed with single-ply sidewalls to save weight.

The sidewall components consist of long strips before they are joined together to form a tire. They must overlap at the material joints. Small irregularities/ripples form in the area of the overlapping components. The overlaps are easier to see from the outside due to the single-ply construction.

### 11.3 Heel and Toe Wear

### 11.4 Wear Spots

- ◆ A wear spot is a flat spot on the tread of the tires that can be caused by extreme braking maneuvers on subsurface such as asphalt.
- ◆ At the same time a tire during the braking maneuver is rubbed at selective points which causes a tire imbalance.
- ◆ The consequences of a wear spot is strong vibrations in the vehicle, which can lead to a worsening of the driving behavior and a higher noise generation.
- ◆ In most cases the tire tends to lock up due to the larger running surface at this location even with a slightly reduced braking effect leading to a further increase in vibrations.
- ◆ Only for low intensity wear spots can the vibrations disappear after a short time through further wear on the tire.

#### NOTICE

**Wear spots on tire with irreparable damage due to extreme braking maneuvers.**

- Replace the tire.

### 11.5 Tire Sidewall Swelling

A swelling in the flank of the tire indicates that the substructure of the shell has been damaged.



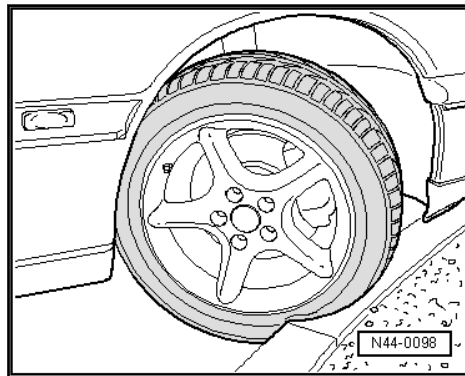


Typical causes for such damage include, for example, driving over curbs at a sharp angle.

Pinching the shell of a tire this way can damage the carcass.

The substructure of the tire is stretched so far that individual fibers in the shell may break.

The extent of the damage depends on the speed of impact, the angle of impact, the air pressure, the axle load and the type of obstacle.

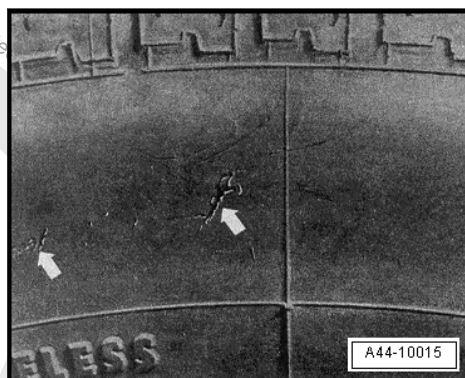


#### Evidence of pinching on the sidewall of a tire -arrows-



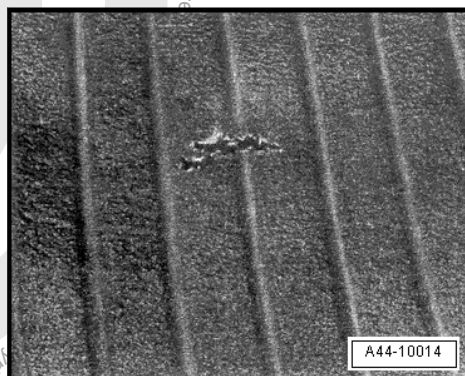
##### Note

- ◆ *Driving over curbs must be avoided!*
- ◆ *When it cannot be avoided, curbs should be driven over very slowly at the bluntest possible angle.*



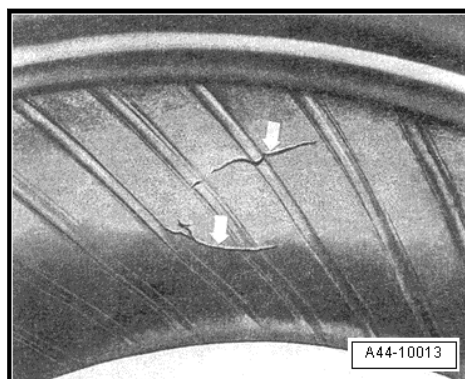
#### Interior view of a tire with a punctured shell.

Due to a severe impact, the shell was pinched on the rim flange and is ruptured in the contact area.



#### Inside tire damage due to impact damage (double rupture)

Double rupture -arrows- caused by pinching when driving over a curb. Often not detectable from outside.





## 11.6 Cuts

Cut caused by a sharp-edged obstacle -arrow-.



## 11.7 Foreign Object Damage

Driving over hard, pointed objects like nails, screws and the like can pierce the tire.

This always leads to tire damage.

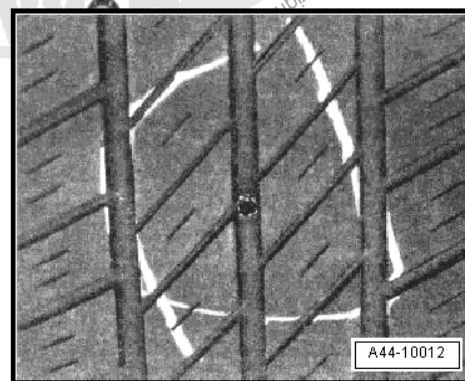
### Damage from embedded foreign bodies

Frequently, the foreign object -marking- is so securely embedded in the tire that it will not free itself even at higher speeds. Due to this, it can act as a plug and seal the tire relatively well. The result is gradual loss of pressure which the driver does not notice immediately but which can lead to sudden and complete tire failure.



#### Note

*No repair should be attempted on steel belted tires of which the structure has been punctured by a foreign object.*



## 11.8 Disintegrated Tread

### Tires with torn-out tread

Such damage usually develops over a longer period of time. If an already damaged tire is exposed to high stress, the centrifugal force at higher speeds can tear components off the tire.

The illustration shows a tire with torn-out tread due to driving with insufficient tire pressure.





## 11.9 Tires, Damage from Low Tire Pressure

The most common causes of failure are small external damage, a defective valve or a leaky rim due to corrosion or damage.

### Separation of shell and rubber

Strong heating due to driving with substantially insufficient pressure led to overheating and subsequent separation of shell from rubber material -arrows-.

The tire shown here was sporadically driven with tire pressure insufficient for the load. Typical indications for this are the circumferential abrasions in the area of the bead caused by the rim flange and the discoloration. Small, furrowed folds are visible along the inner sidewall.

When the tire rolls, strong shear forces develop between the steel belt layers, especially at the ends of the belts.



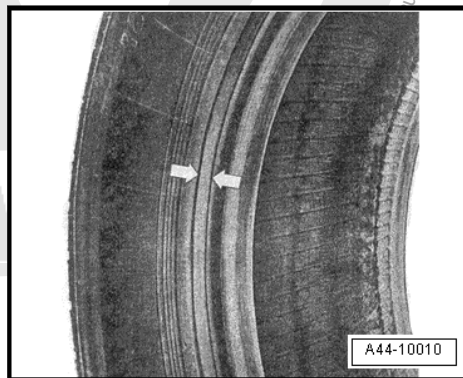
### Tires with wide grooves along the circumference in the area of the bead

Wide grooves along the circumference in the area of the bead -arrows- indicate that the tire was driven with insufficient air pressure.

Driving a vehicle with insufficient tire pressure or ignoring or not recognizing tire damage can have serious consequences.

The tire can no longer withstand the forces developing during travel.

The function of the tire is limited by the defects mentioned above. The rubber compounds separate from one another, resulting in partial separation of tire components up to complete destruction.



## 11.10 Inspecting Tires

Because tire damage can have serious consequences, the technician and the driver should regularly check the tires, as it is the best form of early problem recognition.

Pre-damaged tires cannot withstand driving situations like high vehicle speed, long driving distance, sporty driving style and similar situations.

Damage can occur from various causes:

- ◆ Driving with low tire pressure
- ◆ Mistakes during tire mounting
- ◆ Damage impact damage
- ◆ Aging
- ◆ Incorrect storage



### Note

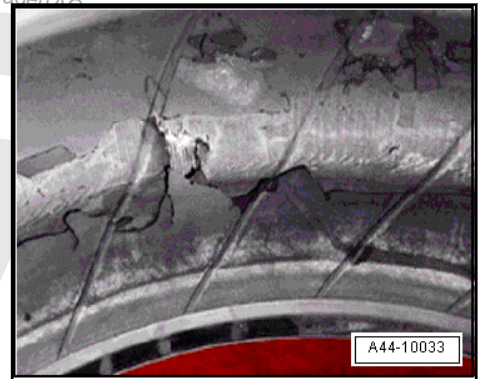
*As soon as a safety risk cannot be ruled out, the tire must be replaced.*



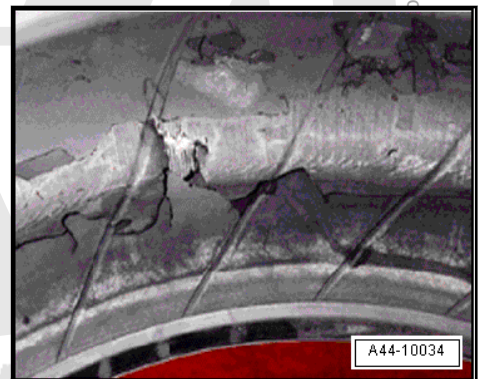


Pay special attention to the following criteria when examining the tire:

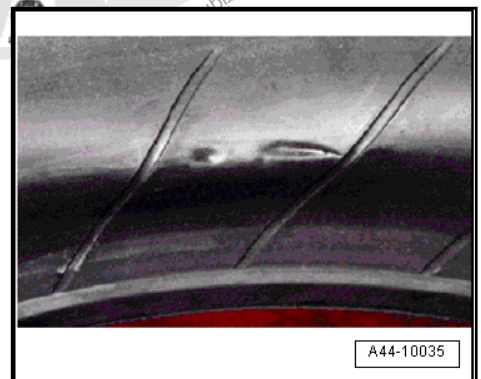
- ◆ Surface erosion or marbling on the inner side (pressure was too low or insufficient for the load)
- ◆ Detached rubber or loose cords



- ◆ Exposed or deformed bead bundle



- ◆ Damage to tire bead with visible cords



## 11.11 Mounting Damage

Bundle broken during tire inflation.



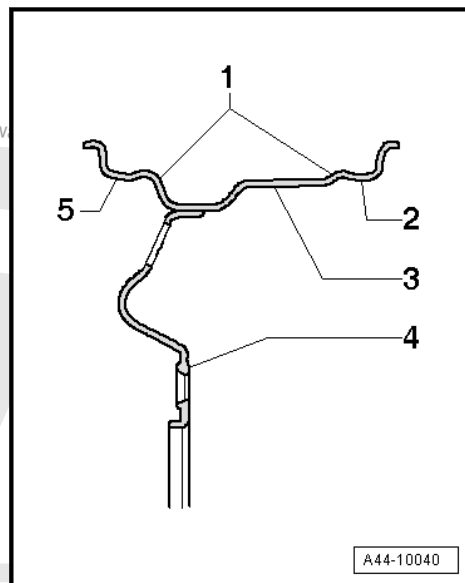
Modern radial car tires are mounted only on safety rims. These have a hump -1- running along the shoulders.

- 1 - Hump (H2)
- 2 - Inner Bead Seat
- 3 - Rim
- 4 - Wheel Disc
- 5 - Outer Bead Seat

The hump prevents the tire from being pressed out of the bead seat during travel with insufficient tire pressure.

When the tire is inflated, the tire bead may not slip completely over the outer rim hump.

In this case, there is the danger that the bead bundle will be overstretched if the tire pressure is too high and the steel wires rupture partially or completely. Torn bundles are often not detectable from outside.



**CAUTION**

**Damaged tire bead core.**

**No secure fit for the tire on the rim.**

- Replace the tire.



## 12 Tire Wear

⇒ ["12.1 Tire Service Life, Influences", page 127](#)

⇒ ["12.2 Heel and Toe Wear", page 128](#)

⇒ ["12.3 High Speed Tires, Wear Characteristics", page 128](#)

⇒ ["12.4 Tread Depth, Measuring", page 129](#)

⇒ ["12.5 Tire Wear, One Sided", page 129](#)

⇒ ["12.6 Tire Wear, Outer Shoulder", page 132](#)

⇒ ["12.7 Diagonal Flattening", page 133](#)

⇒ ["12.8 Tire Wear, Center", page 133](#)

⇒ ["12.9 Recommended Tread Depth Differences", page 134](#)

### 12.1 Tire Service Life, Influences

The following factors influence the service life of a tire in varying degrees.

#### Driving style:

- ◆ Speed
- ◆ Braking
- ◆ Acceleration
- ◆ Cornering

#### Service:

- ◆ Tire Pressure

#### Area:

- ◆ Paving
- ◆ Exterior temperature/climate

#### Vehicle:

- ◆ Weight
- ◆ Dynamic toe and camber values

#### Tire operating conditions

- ◆ Speed range
- ◆ Wet or dry

#### Tire construction:

Winter/summer

#### Changes to the suspension:

If a "lowering-kit" and /or light alloy wheels from accessories which have not been approved by the vehicle manufacturer are used, wheel alignments which deviate from the alignment specified in design may occur during travel.

Even if the adjustment of the axle geometry measured on a standing vehicle is correct, changes in the body height and positions of the wheels during travel can lead to changes to the paths of travel of the suspension.

For this reason, uneven wear is pre-programmed.





## 12.2 Heel and Toe Wear

Heel-and-toe wear is step-like wear of individual tread blocks. Refer to ➤ Fig. **“Appearance of heel-and-toe wear”**, page 128, due to which an increased rolling noise can develop. The heel-and-toe wear is caused by the uneven distortion of the tread blocks in the contact patch. Heel-and-toe wear appears in more extreme forms on non-tractive wheels than on tractive wheels.

New tires have a stronger tendency to heel-and-toe wear, because the high tread blocks have greater elasticity. As tread depth decreases, the rigidity of the tread blocks increases and the tendency to heel-and-toe wear decreases.

### Appearance of heel-and-toe wear

A - Tread blocks of a new tire; viewed in direction of travel -arrow 1-, tread blocks have the same height in front and rear.

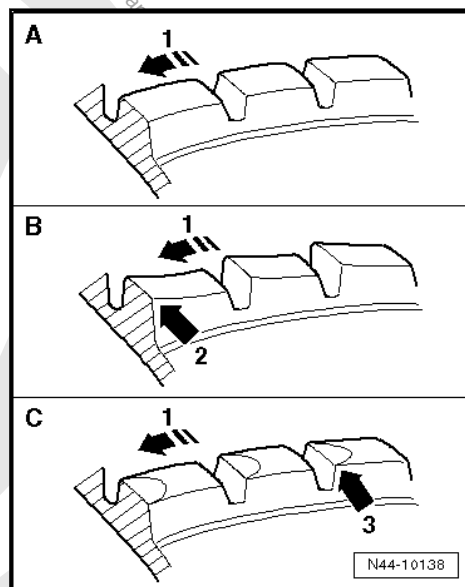
B - Heel-and-toe wear; viewed in direction of travel -arrow 1-, the tread blocks are higher in front than in rear -arrow 2-.

C - Viewed in direction of travel -arrow 1-, tread blocks exhibit significant wear in forward area of “heel-and-toe wear” -arrow 3-.

Extreme heel-and-toe wear may lead to customer complaints about noise.

Increased heel-and-toe wear occurs with:

- ◆ Toe values too great
- ◆ Incorrect air pressure
- ◆ Deep, open treads
- ◆ Tires which are not mounted on the driven axle
- ◆ Extreme driving style around curves.



### Non-directional tires

When heel-and-toe wear occurs, the direction of travel of the tire must be reversed. If increased heel-and-toe wear and rolling noise develop, the tires should be rotated diagonally. This leads to a reduction of heel-and-toe wear.

On vehicles with FWD, this effect is increased by increased wear on front axle.

The rolling noise is somewhat louder immediately after rotating the wheels, but the normal noise level will be reached after traveling approximately 500 to 1,000 km (310.7 to 621.4 miles).

### Directional tires

In the event of increased heel-and-toe wear of the tires on the rear axle - most common with FWD - rotate the wheels from back to front. In the event of increased heel-and-toe wear on the outer edges on one axle, reverse both tires on their rims. Then the left wheel is mounted on the right side and the right wheel on the left side.

## 12.3 High Speed Tires, Wear Characteristics

These tires are designed for the highest speeds. Good traction on wet roads is emphasized when developing these tires. Tread compounds do not have the abrasion resistance of tires for lower speeds, such as T and H tires.

Therefore the service life expectancy of high-speed tires is substantially lower under comparable operating conditions.

## 12.4 Tread Depth, Measuring



### Note

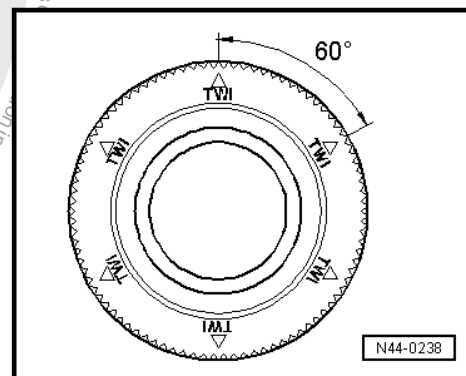
- ◆ *When measuring tread depth, take measurements in the main grooves.*
- ◆ *Do not take measurements at the tread wear indicator.*

Tread depth of a tire must be measured in the main grooves at the points showing the most wear. The positions of the tread wear indicators are marked along the tire shoulder ⇒ [Item 2 \(page 76\)](#).

In place of "TWI", there may also be a "Δ" or "company emblem".

The TWI protrusions are 1.6 mm tall. This is the minimum tread depth legally prescribed in Germany.

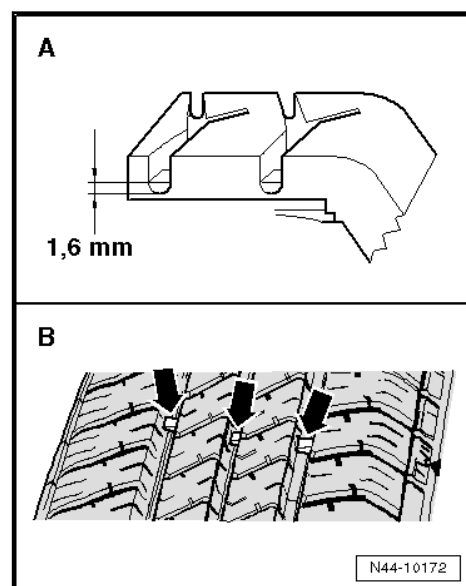
Different values may apply in other countries.



Tread Wear Indicators (TWI) must not be included in the measurement. The deepest point of the groove must be used for the measurement.

A - Tread Wear Indicators in Main Tread Grooves

B - Main Grooves with Tread Wear Indicators -arrows-



## 12.5 Tire Wear, One Sided

In many causes, this is caused by driving style, but sometimes it is also caused by incorrect axle adjustment.



### Increased one-sided wear

One-sided wear, in conjunction with scrub marks on tread ribs and finer grooves, always appears when tires roll at an extreme tire slip angle and consequently »scrub« on the road surface.

Driving quickly around curves leads to increased wear, especially on the outside edge.

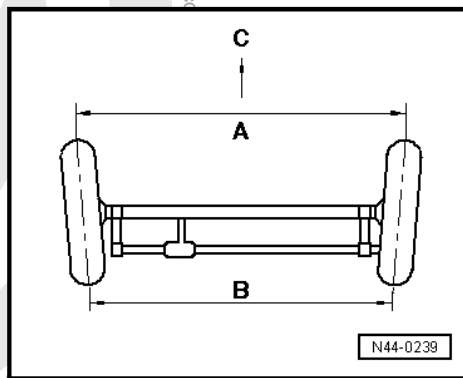
A rounded tire shoulder in conjunction with especially high wear on the outer tread bars indicates fast driving around curves. This wear pattern is influenced by the driving style.

The suspension is adjusted to certain toe and camber values to optimize driving behavior. When tires roll under conditions other than those specified, increased and one-sided wear must be expected.

Strong one-sided wear can be caused especially by incorrect toe and camber values. This increases the danger of diagonal wear spots.

### Toe-out or negative toe-in value

The distance between the fronts of the tires -A- is greater than the distance between the backs of the tires -B- (-C- = direction of travel).

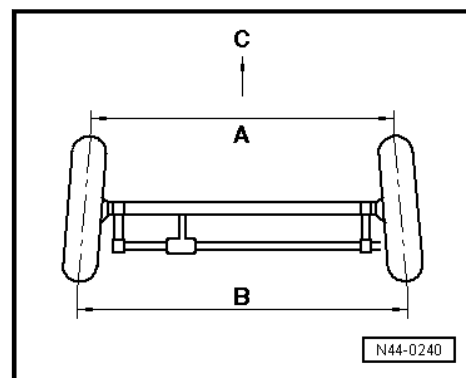


### Toe-in or positive toe-in value

The distance between the fronts of the tires -A- is less than the distance between the backs of the tires -B- (-C- = direction of travel).

To avoid one-sided tire wear, ensure that the wheel alignment remains within the tolerances specified by the vehicle manufacturer. The most common deviation of wheel alignment is caused by external influences, for example hard contact with the curb when parking.

A measurement of the axle geometry can determine whether the wheel alignment is within the specified tolerances or whether a correction of the wheel alignment is necessary.



### Changes to the suspension

If a "lowering-kit" and /or light alloy wheels from accessories which have not been recommended by the vehicle manufacturer are used, wheel alignments which deviate from the alignment specified in design may occur during travel.

Even if the adjustment of the axle geometry measured on a standing vehicle is correct, changes in the body height and positions of the wheels during travel can lead to changes to the paths of travel of the wheel suspension.

For this reason, uneven wear is pre-programmed.

### Improper use of air suspension height adjustment

The use of off road levels is only recommended when driving off road. The permanent use of off road levels on normal roads can lead to increased tire wear because the changed height changes the wheel alignment relative to the road level.

**To prevent one-sided tire wear, correct axle geometry adjustment should be ensured on the one hand, and intended use of the vehicle on the other hand.**

Good vehicle and tire maintenance helps to prevent tire wear. The following points should especially be observed.

- ◆ The specified minimum tire pressures must be maintained.
- ◆ Different wear on front and rear axle cannot be avoided depending on driving style. This can be counteracted by regular tire rotation. This lends itself, for example, to the rotational change from summer to winter tires and back. This change has the positive side effect of all tires wearing evenly so a complete set of new tires can be installed. This prevents use of different tire tread depths on both axles, which can have negative effects on driving behavior.
- ◆ The formation of heel and toe wear is a normal wear pattern, particularly with a very smooth driving style. Refer to ["12.2 Heel and Toe Wear", page 128](#) . This could result in a louder rolling noise which are generally improved with increased tread depth. If heel and toe wear is light or is still forming, rotating the tires from one axle to the other is generally sufficient. With strong heel and toe wear, tires should be rotated according to so that their direction of travel is reversed. Refer to ["12.2 Heel and Toe Wear", page 128](#) . This does not apply to non-directional tires!
- ◆ On some tire profiles, the effect of premature wear can be detected visually: If winter tire ribs or profile recesses have been worn off, only compact tread block without tread pattern, which gives the impression of a worn tire. In this case, the remaining profile depth in each tread groove must be measured. If it is greater than the legally required minimum tread depth (Germany 1.6 mm; it is recommended to use winter tires with a remaining profile of 4 mm only in summer



use [regulation in Austria]), the tires can be reused without restrictions.

## 12.6 Tire Wear, Outer Shoulder

### Improper use of air suspension height adjustment

The use of off road levels is only recommended when driving off road. The permanent use of off road levels on normal roads can lead to increased tire wear because the changed height changes the wheel alignment relative to the road level.

**To prevent one-sided tire wear, correct axle geometry adjustment should be ensured on the one hand, and intended use of the vehicle on the other hand.**

Good vehicle and tire maintenance helps to prevent tire wear. The following points should especially be observed.

- ◆ The specified minimum tire pressures must be maintained.
- ◆ Different wear on front and rear axle cannot be avoided depending on driving style. This can be counteracted by regular tire rotation. This lends itself, for example, to the rotational change from summer to winter tires and back. This change has the positive side effect of all tires wearing evenly so a complete set of new tires can be installed. This prevents use of different tire tread depths on both axles, which can have negative effects on driving behavior.
- ◆ The formation of heel and toe wear is a normal wear pattern, particularly with a very smooth driving style. Refer to ⇒ **"12.2 Heel and Toe Wear", page 128** . This could result in a louder rolling noise which are generally improved with increased tread depth. If heel and toe wear is light or is still forming, rotating the tires from one axle to the other is generally sufficient. With strong heel and toe wear, tires should be rotated according to so that their direction of travel is reversed. Refer to ⇒ **"12.2 Heel and Toe Wear", page 128** . This does not apply to non-directional tires!
- ◆ On some tire profiles, the effect of premature wear can be detected visually: If winter tire ribs or profile recesses have been worn off, only compact tread block without tread pattern, which gives the impression of a worn tire. In this case, the remaining profile depth in each tread groove must be measured. If it is greater than the legally required minimum tread depth (Germany 1.6 mm; it is recommended to use winter tires with a remaining profile of 4 mm only in summer use [regulation in Austria]), the tires can be reused without restrictions.



## 12.7 Diagonal Flattening

### Diagonal flattening on tires

Diagonal flattening runs at an angle of approximately 45° with respect to the plane of circumference.

They usually occur once, but may also occur several times along the tire circumference.

Wear spots appear almost exclusively on the non-tractive tires, especially the rear left tire. There are vehicle models where wear spots appear rounded, which are not a problem. The effect is increased by high toe values. Toe values at the lower tolerance limit of the specified value improve the wear pattern.

The tire component integration is often found in the area with the most pronounced diagonal flattening.

Wheels with toe-in roll with a slip angle even when the vehicle is traveling straight ahead. This leads to diagonal tension in the contact zone between tires/road surface.

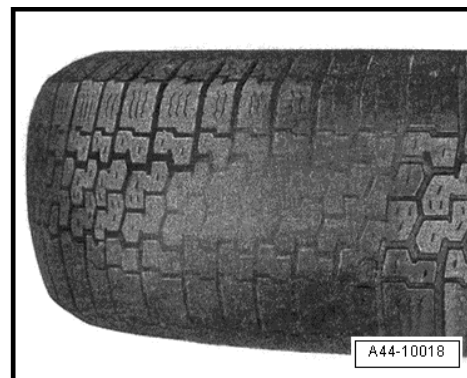
Driving with reduced tire pressure will improve the wear pattern. To prevent such wear patterns, the toe values of both rear wheels should be the same and the specified tire pressure should be maintained.

If wear spots are detected, mount the wheels on the tractive axle if the wear spots are still in the initial stage. Deeper wear spots are irreparable.

### Faulty adjustment

When a customer complains of "diagonal flattening", the toe adjustment must be checked. If the setting is OK, the cause for the diagonal wear spots is most likely in the tires.

Tires with diagonal wear spots which developed due to faulty adjustment of the axle geometry are excluded from the warranty.



## 12.8 Tire Wear, Center

This wear pattern is found on drive wheels on high-powered vehicles that often drive long stretches at high speed.

At high speeds, the centrifugal force increases the tire diameter at the center of the tread more than at the shoulders of the tire. The drive forces from the center area of the tread are transferred to the road surface. This is reflected in the wear pattern.

These effects can appear especially extreme on wide tires.

**Reducing the tire pressure is not an effective remedy for this wear pattern.**



### Note

*For safety reasons, tire pressure must never be lowered below specified pressure under any circumstances.*

A largely even wear pattern can be achieved if tires are changed in a timely manner from the driven to the non-driven axle.

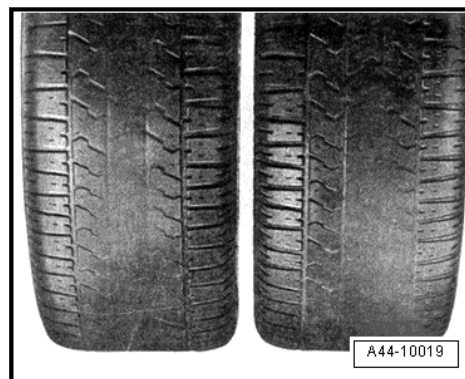




### Increased tread wear

Typical wear pattern of tires on the driven axle of high-powered vehicles.

The increased wear at the tread center is caused by stresses related to the centrifugal force of the tire and the transmission of traction forces.



## 12.9 Recommended Tread Depth Differences

- ◆ Only use tires of the same type and same tread design on all four tires.
- ◆ Different tire tread circumferences can lead to tension on the drivetrain and increased tire wear with possible subsequent damage.

### Vehicles with an Electric Motor

Front axle to rear axle	Left axle to right axle
- -	2 mm.

### Vehicles with an Internal Combustion Engine

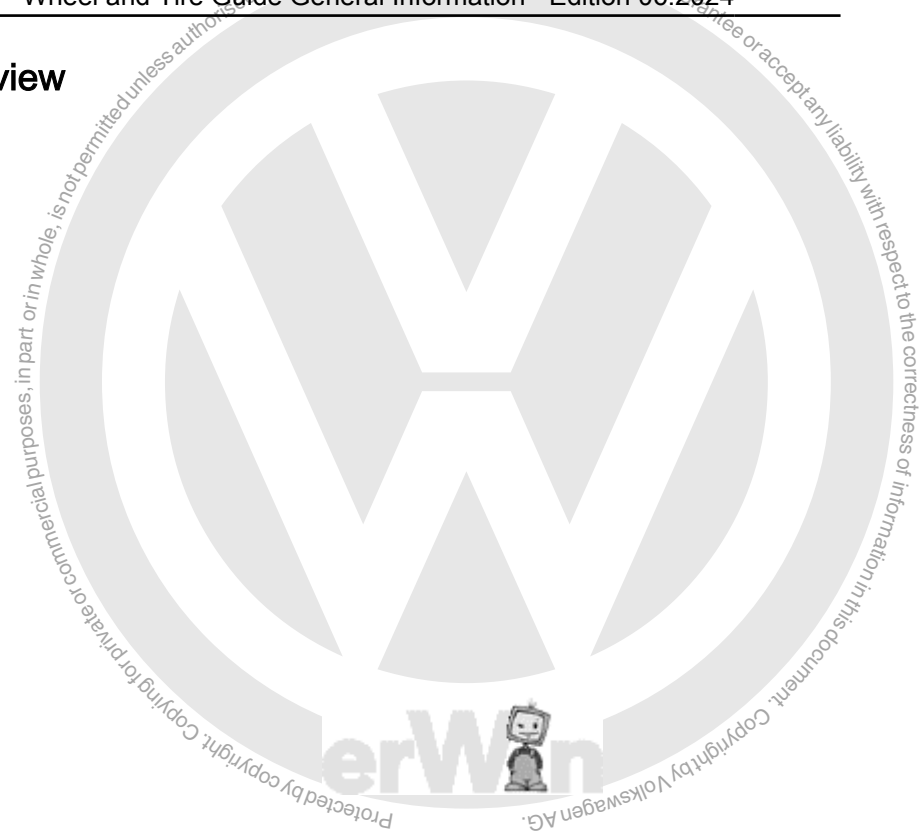
Driving mode	Front axle to rear axle	Left axle to right axle
FWD	-	2 mm.
AWD	2 mm.	2 mm.



## 13 Component Overview

⇒ ["13.1 Overview - Wheel", page 135](#)

### 13.1 Overview - Wheel





## 1 - Wheel

- ❑ Installing the wheel.  
Refer to ➤ [“3 Wheel, Changing”, page 16](#).

## 2 - Wheel Bolts

- ❑ There are different versions. Refer to ➤ [“6 Wheel Bolts”, page 71](#).

## 3 - Tires

- ❑ Refer to ➤ [“7 Tire Information”, page 75](#)

## 4 - Valve/Tire Pressure Monitoring Sensor

- ❑ Always replace the valve
- ❑ Only install the valve specified in the ➤ Electronic Parts Catalog (ETKA).
- ❑ Refer to ➤ [“5.3 Overview - Tire Pressure Monitoring Sensor”, page 49](#)

## 5 - Rim

- ❑ Note the assembly instructions. Refer to ➤ [“4.5 Tires, Mounting”, page 26](#).
- ❑ Refer to ➤ [“9 Disc Wheel \(Rim\), Information”, page 99](#)
- ❑ Refer to ➤ [“9.1 Disc Wheel \(Rim\), Structure”, page 99](#)

## 6 - Adhesive Balancing Weights

- ❑ Maximum 60 grams per rim flange permitted
- ❑ Clean wheel where it will be adhered so it is free of dirt and grease
- ❑ Remove protective film.
- ❑ Attach balance weights to intended surfaces.

## 7 - Anti-Theft Wheel Bolt

- ❑ Note the assembly instructions. Refer to ➤ [“6 Wheel Bolts”, page 71](#).
- ❑ Handling. Refer to ➤ [Fig. “Anti-Theft Wheel Bolt”, page 72](#)

## 8 - Anti-Theft Wheel Bolt Adapter

- ❑ Place on wheel bolt. Refer to ➤ [Fig. “Anti-Theft Wheel Bolt”, page 72](#).

## 9 - Anti-Theft Wheel Bolt Cap

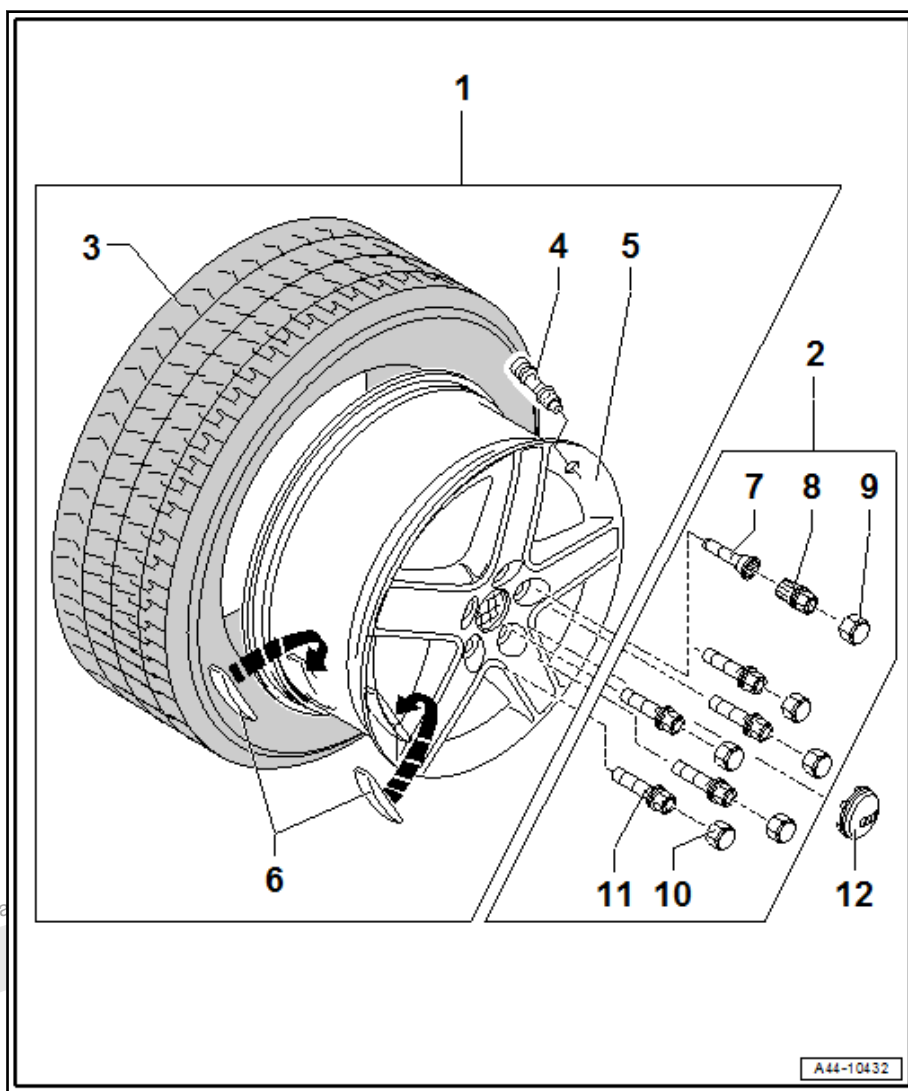
## 10 - Wheel Bolt Cap

## 11 - Wheel Bolts

- ❑ Tightening specification. Refer to ➤ Suspension, Wheels, Steering; Rep. Gr. 44 ; Wheels, Tires; Wheel Bolts Tightening Specifications



Note





*Make sure the correct wheel bolts are installed. Refer to the ⇒ [Electronic Parts Catalog \(ETKA\)](#) .*

- ☐ Note the assembly instructions. Refer to ⇒ [“6 Wheel Bolts”, page 71](#) .

## 12 - Hub Cap

- ☐ Removing and Installing. Refer to ⇒ [“9.6 Hub Cap for Alloy Wheels with Open Threaded Connection, Removing and Installing”, page 102](#) .





## 14 Snow Chains

⇒ **"14.1 Snow Chains, Assembling and Using", page 138**

### 14.1 Snow Chains, Assembling and Using

Snow chains may be mounted only on the drive wheels.

If the vehicle has AWD, then snow chains may be used on the front wheels only.

Snow chains are not possible with all-wheel/tire combinations. Type and size of snow chains. Refer to the ⇒ Owner's Manual; Snow Chains .

If no special snow chain type is specified, a snow chain with small chain links can be used. Only chains which do not stand up more than 15 mm, including chain lock, may be applied on tire tread and inner sides.

With some models and certain wheel/tire combinations, only snow chains with small chain links can be used. Corresponding notes can be found in the vehicle parts certificate table.

**The legally permitted maximum speed when driving with snow chains is 50 km/h (31.1 mph).**

Remove the snow chains before driving on snow-free roads. It does not make sense to leave them on because the handling characteristics become worse. During this, the tires are stressed unnecessarily and the chain wear is particularly high.





## 15 Temporary Spare Tires, Spare Tires and Recommended Spare Tires

⇒ [“15.1 Spare Tire with Yellow Sticker”, page 139](#)

⇒ [“15.2 Temporary Spare Tires and Recommended Spare Tires”, page 140](#)

### 15.1 Spare Tire with Yellow Sticker

The notes listed in the following also apply to spare wheels, for example 6 J x 15 with 195/65 R 15 tires, which are marked with the lettering “MAX 80 km/h (49.7 mph)” or “MAX 50 mph” on a yellow sticker.

The vehicle may have a spare tire with the above mentioned sticker in place of a temporary spare tire, depending on the vehicle equipment.

The temporary spare tire/spare tire is designed only for temporary and short-term use. Therefore it must be replaced with a standard wheel as soon as possible.

After mounting the temporary spare tire/spare tire, the tire pressure must be checked as quickly as possible.

The tire pressures are listed on the tire pressure label on the inside of the fuel filler door and on the driver side B-pillar.

Always pay attention to the speed rating information on the temporary spare tire (“MAX 80 km/h (49.7 mph)” or “MAX 50 mph”).

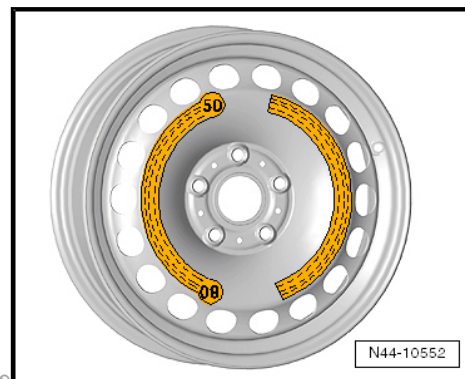
Full-throttle acceleration, hard braking and driving rapidly around curves should be avoided.

Never drive with more than one temporary spare tire/spare tire.

For technical reasons, it is not permitted to use snow chains on the temporary spare tire.

If the vehicle must be driven with snow chains, the temporary spare tire must be installed on the rear axle when there is a faulty front wheel. The dismantled rear wheel must then be mounted in place of the faulty front wheel.

Refer to the ⇒ Electronic Parts Catalog (ETKA) for the replacement part numbers.







## 15.2 Temporary Spare Tires and Recommended Spare Tires

⇒ ["15.2.1 Atlas MY 2017", page 140](#)

⇒ ["15.2.2 Golf MY 2013 and e-Golf MY 2014", page 140](#)

⇒ ["15.2.3 Golf MY 2017 and e-Golf MY 2017", page 140](#)

⇒ ["15.2.4 Golf Sportsvan MY 2015", page 141](#)

⇒ ["15.2.5 Golf Wagon MY 2014", page 141](#)

⇒ ["15.2.6 Golf Wagon MY 2017", page 141](#)

⇒ ["15.2.7 Golf MY 2018 \(AU2 / BX6\)", page 141](#)

⇒ ["15.2.8 Jetta MY 2018", page 141](#)

⇒ ["15.2.9 Taos MY 2021", page 142](#)



### Note

Due to repair manual revisions, any information regarding temporary spare tires will now be located in ⇒ Wheel and Tire Guide; Rep. Gr. 44 ; Wheel/Tire Combinations .

### 15.2.1 Atlas MY 2017

Refer to the ⇒ Electronic Parts Catalog (ETKA) for the replacement part numbers.

Disc Wheel	Tires		
Dimension	Dimension	Manufacturer	Tread
4 J x 17 ET 20	T165/80 R 17 104M	GiTi	GT Radial

### 15.2.2 Golf MY 2013 and e-Golf MY 2014

Refer to the ⇒ Electronic Parts Catalog (ETKA) for the replacement part numbers.

Disc Wheel	Tires		
Dimension	Dimension	Manufacturer	Tread
3.5 J x 18 ET 25.5	T125/70 R 18 99M	Continental	CST 17
3.5 J x 16 ET 25.5. Refer to 2).	T125/70 R 16 96M	Continental	CST 17

2) Not for 4Motion

### 15.2.3 Golf MY 2017 and e-Golf MY 2017

Refer to the ⇒ Electronic Parts Catalog (ETKA) for the replacement part numbers.

Disc Wheel	Tires		
Dimension	Dimension	Manufacturer	Tread
3.5 J x 18 ET 25.5	T125/70 R 18 99M	Continental	CST 170
3.5 J x 16 ET 25.5. Refer to 3).	T125/70 R 16 96M	Continental Hankook Kumho Maxxis	CST 17 S300 121 M9500N



3) Not for 4Motion

## 15.2.4 Golf Sportsvan MY 2015

Refer to the ⇒ Electronic Parts Catalog (ETKA) for the replacement part numbers.

Disc Wheel	Tires		
Dimension	Dimension	Manufacturer	Tread
3.5 J x 18 ET 25.5	T125/70 R 18 99M	Continental	CST 17
3.5 J x 16 ET 25.5	T125/70 R 16 96M	Continental	CST 17

## 15.2.5 Golf Wagon MY 2014

Refer to the ⇒ Electronic Parts Catalog (ETKA) for the replacement part numbers.

Disc Wheel	Tires		
Dimension	Dimension	Manufacturer	Tread
3.5 J x 18 ET 25.5	T125/70 R 18 99M	Continental	CST 17
3.5 J x 16 ET 25.5. Refer to 4).	T125/70 R 16 96M	Continental	CST 17

4) Not for 4Motion

## 15.2.6 Golf Wagon MY 2017

Refer to the ⇒ Electronic Parts Catalog (ETKA) for the replacement part numbers.

Disc Wheel	Tires		
Dimension	Dimension	Manufacturer	Tread
3.5 J x 18 ET 25.5	T125/70 R 18 99M	Continental	CST 170
3.5 J x 16 ET 25.5. Refer to 5).	T125/70 R 16 96M	Continental Hankook Kumho Maxxis	CST 17 S300 121 M9500N

5) Not for 4Motion

## 15.2.7 Golf MY 2018 (AU2 / BX6)

Refer to the ⇒ Electronic Parts Catalog (ETKA) for the replacement part numbers.

Disc Wheel	Tires		
Dimension	Dimension	Manufacturer	Tread
3.5 J x 16 ET 25.5	T125/90 R 16 98M	Continental	CST 17
3.5 J x 18 ET 25.5	T125/70 R 18 99M	Continental	CST 17

## 15.2.8 Jetta MY 2018

Refer to the ⇒ Electronic Parts Catalog (ETKA) for the replacement part numbers.

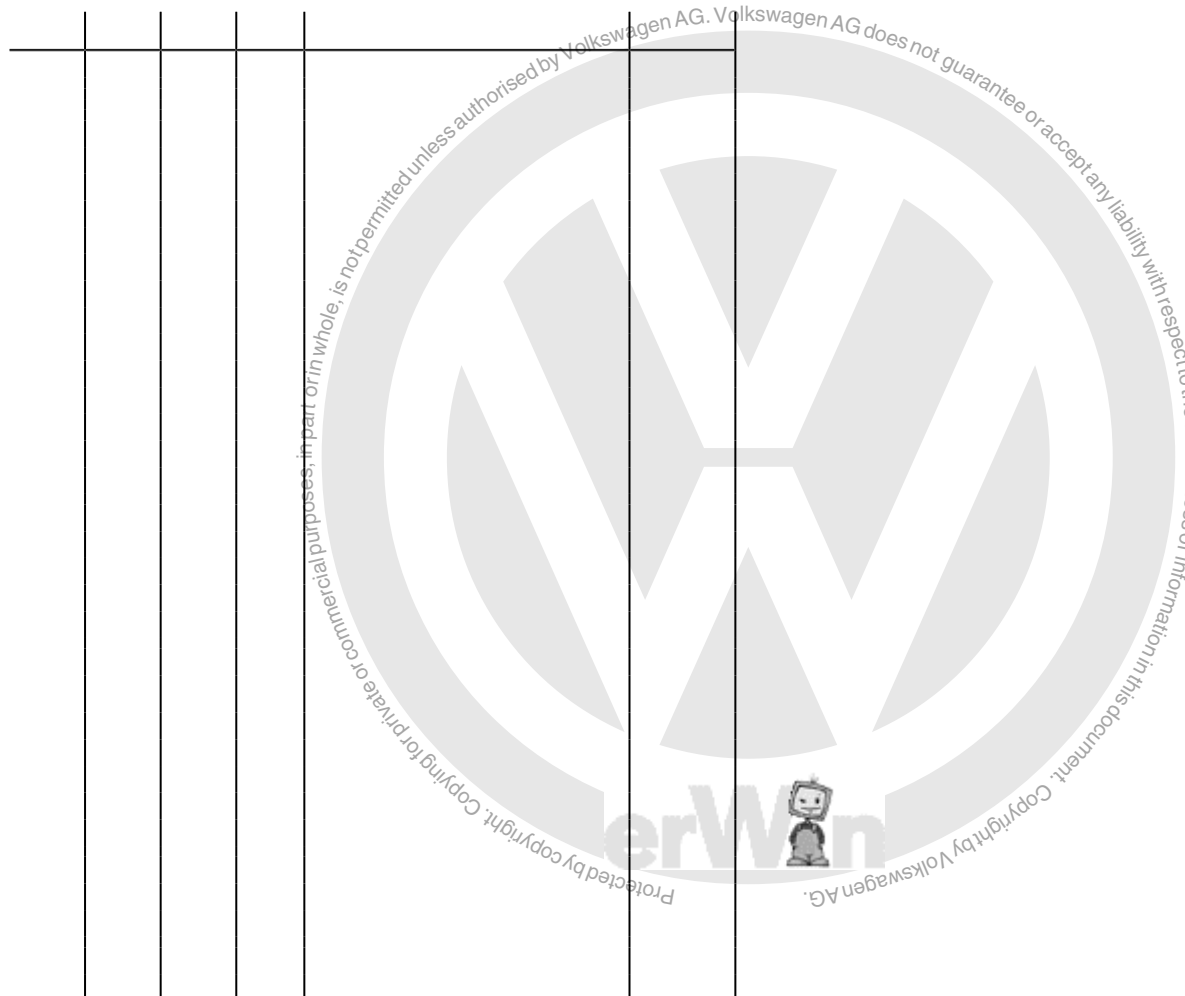


Disc Wheel	Tires		
Dimension	Dimension	Manufacturer	Tread
3.5 J x 16 ET 25.5	T125/90 R 16 98M	Continental	CST 17
3.5 J x 18 ET 25.5	T125/70 R 18 99M	Continental	CST 17

### 15.2.9 Taos MY 2021

Refer to the ⇒ Electronic Parts Catalog (ETKA) for the replacement part numbers.

Disc Wheel	Tires		
Dimension	Dimension	Manufacturer	Tread
3.5 J x 18 ET 25.5	T125/70 R 18 99M	Linglong	T010



# Cautions & Warnings

**Please read these WARNINGS and CAUTIONS before proceeding with maintenance and repair work. You must answer that you have read and you understand these WARNINGS and CAUTIONS before you will be allowed to view this information.**

- If you lack the skills, tools and equipment, or a suitable workshop for any procedure described in this manual, we suggest you leave such repairs to an authorized Volkswagen retailer or other qualified shop. We especially urge you to consult an authorized Volkswagen retailer before beginning repairs on any vehicle that may still be covered wholly or in part by any of the extensive warranties issued by Volkswagen.
- Disconnect the battery negative terminal (ground strap) whenever you work on the fuel system or the electrical system. Do not smoke or work near heaters or other fire hazards. Keep an approved fire extinguisher handy.
- Volkswagen is constantly improving its vehicles and sometimes these changes, both in parts and specifications, are made applicable to earlier models. Therefore, part numbers listed in this manual are for reference only. Always check with your authorized Volkswagen retailer parts department for the latest information.
- Any time the battery has been disconnected on an automatic transmission vehicle, it will be necessary to reestablish Transmission Control Module (TCM) basic settings using the Volkswagen Factory Approved Scan Tool (ST).
- Never work under a lifted vehicle unless it is solidly supported on stands designed for the purpose. Do not support a vehicle on cinder blocks, hollow tiles or other props that may crumble under continuous load. Never work under a vehicle that is supported solely by a jack. Never work under the vehicle while the engine is running.
- For vehicles equipped with an anti-theft radio, be sure of the correct radio activation code before disconnecting the battery or removing the radio. If the wrong code is entered when the power is restored, the radio may lock up and become inoperable, even if the correct code is used in a later attempt.
- If you are going to work under a vehicle on the ground, make sure that the ground is level. Block the wheels to keep the vehicle from rolling. Disconnect the battery negative terminal (ground strap) to prevent others from starting the vehicle while you are under it
- Do not attempt to work on your vehicle if you do not feel well. You increase the danger of injury to yourself and others if you are tired, upset or have taken medicine or any other substances that may impair you or keep you from being fully alert.
- Never run the engine unless the work area is well ventilated. Carbon monoxide (CO) kills.
- Always observe good workshop practices. Wear goggles when you operate machine tools or work with acid. Wear goggles, gloves and other protective clothing whenever the job requires working with harmful substances.
- Tie long hair behind your head. Do not wear a necktie, a scarf, loose clothing, or a necklace when you work near machine tools or running engines. If your hair, clothing, or jewelry were to get caught in the machinery, severe injury could result.
- Do not re-use any fasteners that are worn or deformed in normal use. Some fasteners are designed to be used only once and are unreliable and may fail if used a second time. This includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow the recommendations in this manual - replace these fasteners with new parts where indicated, and any other time it is deemed necessary by inspection.

# Cautions & Warnings

- Illuminate the work area adequately but safely. Use a portable safety light for working inside or under the vehicle. Make sure the bulb is enclosed by a wire cage. The hot filament of an accidentally broken bulb can ignite spilled fuel or oil.
- Friction materials such as brake pads and clutch discs may contain asbestos fibers. Do not create dust by grinding, sanding, or by cleaning with compressed air. Avoid breathing asbestos fibers and asbestos dust. Breathing asbestos can cause serious diseases such as asbestosis or cancer, and may result in death.
- Finger rings should be removed so that they cannot cause electrical shorts, get caught in running machinery, or be crushed by heavy parts.
- Before starting a job, make certain that you have all the necessary tools and parts on hand. Read all the instructions thoroughly; do not attempt shortcuts. Use tools that are appropriate to the work and use only replacement parts meeting Volkswagen specifications. Makeshift tools, parts and procedures will not make good repairs.
- Catch draining fuel, oil or brake fluid in suitable containers. Do not use empty food or beverage containers that might mislead someone into drinking from them. Store flammable fluids away from fire hazards. Wipe up spills at once, but do not store the oily rags, which can ignite and burn spontaneously.
- Use pneumatic and electric tools only to loosen threaded parts and fasteners. Never use these tools to tighten fasteners, especially on light alloy parts. Always use a torque wrench to tighten fasteners to the tightening torque listed.
- Keep sparks, lighted matches, and open flame away from the top of the battery. If escaping hydrogen gas is ignited, it will ignite gas trapped in the cells and cause the battery to explode.
- Be mindful of the environment and ecology. Before you drain the crankcase, find out the proper way to dispose of the oil. Do not pour oil onto the ground, down a drain, or into a stream, pond, or lake. Consult local ordinances that govern the disposal of wastes.
- The air-conditioning (A/C) system is filled with a chemical refrigerant that is hazardous. The A/C system should be serviced only by trained automotive service technicians using approved refrigerant recovery/recycling equipment, trained in related safety precautions, and familiar with regulations governing the discharging and disposal of automotive chemical refrigerants.
- Before doing any electrical welding on vehicles equipped with anti-lock brakes (ABS), disconnect the battery negative terminal (ground strap) and the ABS control module connector.
- Do not expose any part of the A/C system to high temperatures such as open flame. Excessive heat will increase system pressure and may cause the system to burst.
- When boost-charging the battery, first remove the fuses for the Engine Control Module (ECM), the Transmission Control Module (TCM), the ABS control module, and the trip computer. In cases where one or more of these components is not separately fused, disconnect the control module connector(s).
- Some of the vehicles covered by this manual are equipped with a supplemental restraint system (SRS), that automatically deploys an airbag in the event of a frontal impact. The airbag is operated by an explosive device. Handled improperly or without adequate safeguards, it can be accidentally activated and cause serious personal injury. To guard against personal injury or airbag system failure, only trained Volkswagen Service technicians should test, disassemble or service the airbag system.

## Cautions & Warnings

- Do not quick-charge the battery (for boost starting) for longer than one minute, and do not exceed 16.5 volts at the battery with the boosting cables attached. Wait at least one minute before boosting the battery a second time.
- Never use a test light to conduct electrical tests of the airbag system. The system must only be tested by trained Volkswagen Service technicians using the Volkswagen Factory Approved Scan Tool (ST) or an approved equivalent. The airbag unit must never be electrically tested while it is not installed in the vehicle.
- Some aerosol tire inflators are highly flammable. Be extremely cautious when repairing a tire that may have been inflated using an aerosol tire inflator. Keep sparks, open flame or other sources of ignition away from the tire repair area. Inflate and deflate the tire at least four times before breaking the bead from the rim. Completely remove the tire from the rim before attempting any repair.
- When driving or riding in an airbag-equipped vehicle, never hold test equipment in your hands or lap while the vehicle is in motion. Objects between you and the airbag can increase the risk of injury in an accident.

**I have read and I understand these Cautions and Warnings.**

